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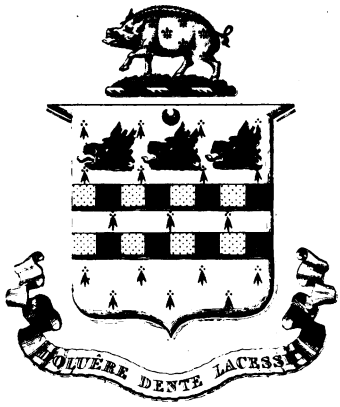

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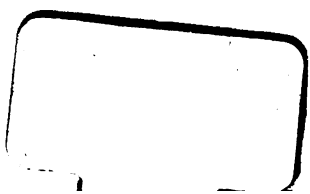
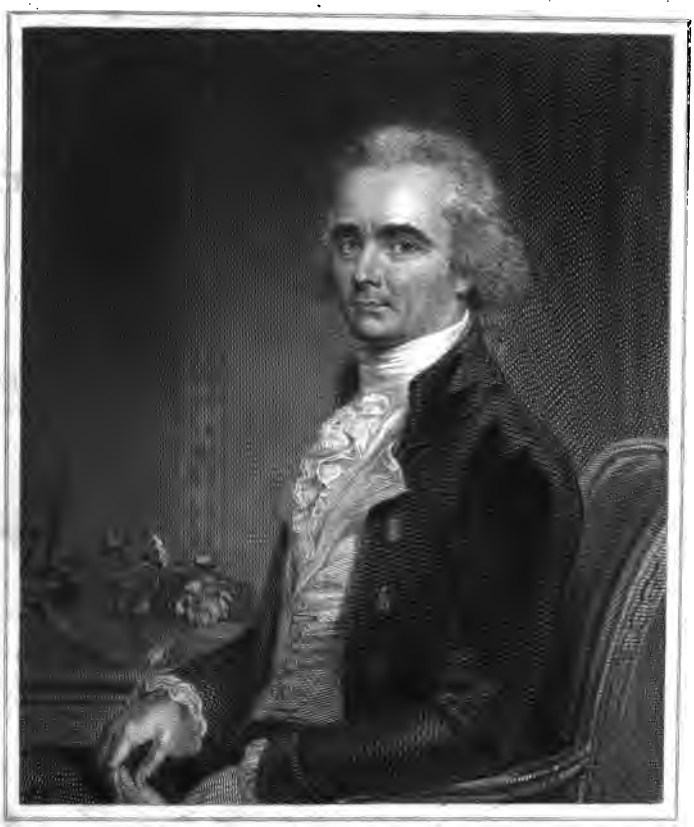




William Roxburgh M.D. F.L.S
Superintendant of the Hon.ble the East-India Company's
Botanic Garden at Calcutta,
Late Honorary Corresponding Member of the Society
for the Encouragement of Arts, Manufactures and Commerce.

Engraved by Charles Warren Esq.r from a Miniature
in the possession of Mr.s Roxburgh.

TRANSACTIONS

OF THE

SOCIETY,

INSTITUTED AT LONDON,

FOR THE

ENCOURAGEMENT

OF

ARTS MANUFACTURES, AND COMMERCE;

WITH THE

Premiums offered in the Year 1815,

AND

THE RULES AND ORDERS OF THE SOCIETY.

VOL. XXXIII.

LONDON:

PRINTED BY R. WILKS, CHANCERY LANE;

Sold by the HOUSEKEEPER, at the SOCIETY'S HOUSE, in the ADELPHI; and by Messrs. WHITE, BECKET, JOHNSON, CADELL and DAVIES, PHILLIPS, WAITE, RICHARDSON, LONGMAN and REES, NORMANVILLE & FELL, TAYLOR, and T. WOODFALL, 14, Sloane Square, Chelsea.

[PRICE TEN SHILLINGS AND SIXPENCE.]

MDCCCXV.

PREFACE.

THE Society instituted for the Encouragement of ARTS, MANUFACTURES, and COMMERCE, have usually prefixed as a Frontispiece to each of their Volumes, the Portrait of some one of their distinguished Officers; but on the present occasion they have been induced to deviate from that rule, by paying their tribute of respect to the Memory of the late Dr. WM. ROXBURGH, who was, for many years, the Superintendant of the Hon. East India Company's Botanic Garden at Calcutta, and an Honorary Member of this Society, whose volumes have been frequently enriched by his communications.

It would have occupied too much space in this Preface, to have given even a brief account of the great exertions which he made for the improvement of Natural History, and its application to the useful Arts, a more detailed view of them

will be found at page 156, of this vol. under the Class of Colonies and Trade.

The arrangements in the present Volume have been made in the usual order, commencing with the Class of AGRICULTURE.

The unremitting endeavours in that department, of John Christian Curwen, Esq. of Workington-Hall, a Vice-President of this Society, deserve the most unqualified praise; he has lately added to his extensive farms near Workington, above four hundred acres of land heretofore waste and uncultivated; the whole has been well inclosed, sown with red wheat and oats, and afterwards with clover. He has manured the land upon a new principle, with burnt earth-ashes and lime, a system likely to be attended with the most beneficial results; he has detailed the method by which this is effected, and has furnished valuable information upon the fattening of cattle, with a view to prepare them for the market in less time and with less expense than has been heretofore required. He has been honoured by the Society with a Gold Medal.

To Backe Thornhill, Esq. of Stanton, near Bakewell, a Gold Medal has been awarded, for planting one hundred and sixteen acres of land with Forest Trees; besides which, he has since proceeded in planting other barren parts of the late common

common of Stanton, to an extent of 270 acres, which is now thriving wood land, well inclosed, and intersected with carriage roads. By this improvement, in addition to the usual advantages of ornament and profit, good shelter is procured to the adjoining land, which peculiarly wanted such protection.

A Gold Medal has also been given to Henry Coape, Esq. of Gloucester-place, Portman-square, for gaining from the river Crouch, in Essex, 110 acres of Land, by means of Embankments, which he has made sufficiently strong to secure the land from the highest tides, and is likely soon to be valuable and productive.

The Pruning Shears for cutting Wood, invented by Mr. James Ogden, of Duckinfield, have great merit, from the ingenuity of their construction and powerful effect; in using the common shears employed for such purposes, the pressure upon the wood being made forward, occasions it, if elastic, frequently to elude the cut, and requires the operation to be renewed; whereas, in using Mr. Ogden's implements, the wood to be cut is drawn within the blades, so as to render the effect certain. The Society have presented him with the sum of Ten Guineas.

When the inconvenience experienced in a Country Residence where a vicious Bull is in the neighbourhood, and the dreadful wounds and other fatal accidents occasioned by

such an animal are considered, much satisfaction must be derived from the invention of a simple and efficacious apparatus, by H. J. Nicholls, Esq. of Wood-House, for preventing such accidents, and hindering the Bull from lifting up gates or destroying fences. The principle upon which it is constructed, is by occasioning such acute pain to the nostrils of the animal in attempting to use his horns, that he is only relieved by desisting from his purpose, finding himself at ease except when such attempts are made. The Society have presented to Mr. Nicholls their Silver Medal.

The preservation of Vegetable Food for Men and Cattle, during the winter months is of considerable importance. Mr. H. B. Way, of Bridport Harbour, has proved, by the judicious application of a small portion of sand to carrots in air-tight casks or close vessels, that putrifaction is prevented, and the carrots preserved perfectly sound all the winter months. A communication from Mr. Whitlow, upon the preservation of Potatoes for exportation, which will be found under the Class of Colonies and Trade, confirms this principle. The Silver Ceres Medal was presented to Mr. Way.

In order to prevent the loss arising to Farmers in bad seasons, from Grain or Pulse being housed wet, Mr. William Bowler has exerted his ingenuity in contriving a portable Stove to dry and preserve it, for which he has been rewarded with Five Guineas. This Stove seems more particularly

In the Class of MECHANICS, the Committee have, as usual, been constantly engaged during the whole Session, and many important discoveries will be found detailed under this head.

To alleviate pain, and to rescue from the jaws of death those brave men whose blood is shed in their country's cause, to ease the pangs of the female sex in the hour of labour, and to alleviate the racking tortures arising from the stone in the bladder, are objects naturally demanding the attention of a Society formed for the public good, and whose liberality on such occasions is not confined to the natives of the British Empire. To the Chevalier Paul Assalini, of Munich, Physician and Surgeon to Prince Eugene, of Bavaria, the Society have this Session presented their Gold Medal, for a variety of very ingenious Surgical Instruments invented or improved by him, and which are likely to be of infinite service in many operations.

To John Hyslop, Esq. the Silver Medal has been given, for an improvement in the Lancet, which possesses considerable advantages, particularly in opening deep abscesses, and preventing the dangers which arise from the exposure of such wounds to the air.

The curious Pump invented by Mr. William Franklin, is cheap, and simple in construction, it combines the powers of a lifting and forcing pump in a single barrel, and furnishes a

continued

invention for such purpose, and been honoured with the Silver Medal.

To Mr. John Barrow, two rewards have been given, namely, the Silver Medal and Ten Guineas, for a Double Door Spring, to open either way; and the Silver Isis Medal, for a Single Door Spring, upon a very cheap and simple principle.

The very ingenious Weighing Machine, for domestic use, invented by Mr. James Braby, may, on a slight inspection, appear to resemble the Steel-yards and Balances before in use; but on a minuter examination, will be found to possess great independent merit from its accuracy in weighing, the ease of its adjustment, from its occupying very little room when not in use, and not being liable to be out of order. He has been presented with the Silver Medal.

Under the Class of COLONIES and TRADE, it will be found that an improvement by Mr. Phillips London, in the preparation of Salt by Fusion, has been the means of furnishing Mackarel in an excellent state both for home consumption and exportation; many thousands of this fish, which would have been destroyed by putrefaction, are thus rendered useful to every class of society. The particular process for curing Mackarel is detailed in page 204, of the 32d Volume of Transactions. The Salt prepared by Mr. London is also excellently

excellently adapted for the preservation of all other animal food. Mr. London has been presented with the Silver Medal set in Gold.

The active mind of the late Dr. Roxburgh has furnished the Society with many communications on the products of the Eastern World, and several of his discoveries are stated in the paper inserted in this Class; he has likewise added an interesting communication on the various articles which the Natives of the East may have recourse to for food, in cases of failure of their Rice Crops, which has frequently occasioned great mortality there by famine.

Captain Cotton has brought to the particular notice of the Society, a valuable substitute for Hemp, superior in strength to English or Russian Hemp. This plant is named the *Urtica-tenacissima*, and its fibre Calooee Hemp; it grows plentifully in its natural state in the Island of Sumatra, and is now cultivated in different parts of India, owing to the exertions of Captain Cotton and the late Dr. Roxburgh, and is likely to be an article of the greatest importance to the British Navy. The Silver Medal has been presented to Captain Cotton.

To Mr. Charles Whitlow, who has traversed the greatest part of the American Continent in search of the various natural products likely to be useful, and taken considerable pains

The Society take the present opportunity of returning their Thanks to the different Public Bodies and individuals who have honoured them with Presents during the Session, the particulars of which are noticed near the close of the present Volume.

It is with great pleasure we add, that the Society has been for many years continuing to rise in public estimation, and that the accession of Members since the opening of the present Session, has far exceeded that of any former period.

The Society desire it to be clearly understood, that as a body they are not responsible for any opinion or representation of facts contained in the following pages.

PREMIUMS

OFFERED IN THE YEAR 1815.

BY THE SOCIETY

INSTITUTED FOR THE ENCOURAGEMENT

OF

ARTS, MANUFACTURES, AND COMMERCE,

IN THE ADELPHI, LONDON.

THE Meetings of the Society are held at their House in the Adelphi, London; and the consideration of the Claims, offered in the present List, will take place, during the Session of the Society, commencing on Wednesday, the 1st *of November,* 1815.

ADVERTISEMENT TO THE PUBLIC.

THE Chief objects of the SOCIETY are to promote the Arts, Manufactures and Commerce of this Kingdom, by giving honorary or pecuniary Rewards, as seems to them best adapted to the case, for all such useful Inventions, Discoveries, and Improvements, (though not mentioned in this book) as tend to that purpose; and, in pursuance of this plan, the Society have already expended above EIGHTY THOUSAND POUNDS, advanced by voluntary subscriptions of their members, and legacies bequeathed.

The Register of the Premiums and Bounties they have given, which may be seen at the SOCIETY's house in the *Adelphi* will shew the very great advantages which the Public have derived from this Institution.

The meetings of the SOCIETY are held every *Wednesday*, at seven o'clock in the evening, from the *first Wednesday in November* to the *second Wednesday* in *June*. The several Committees meet on other evenings in the week during the session, as particularly mentioned in their printed book of Rules and Orders.

In order still farther to promote the laudable Views of the SOCIETY, it may be necessary to explain the mode by which members are elected.

Each member has the privilege, at the meeting of the SOCIETY, or by letter to the Secretary, to propose any person who is desirous to become a member, provided the proposal contains the name, with the full addition, and place of abode, of the proposed member, and is signed by three members of the SOCIETY.

Peers of the Realm or Lords of Parliament are, on their being proposed, immediately balloted for; the names of other persons proposed to become Members are to be delivered to the Secretary, read at the next meeting of the SOCIETY, and then inserted in lists which are hung up in the SOCIETY's room; they are balloted for at the second following ordinary meeting. In both cases, if two thirds of the members then voting ballot in their favour, they are deemed perpetual members upon payment of not less than Twenty Guineas in one sum, or subscribing members upon payment of any sum not less than Two Guineas annually

All members are entitled to vote and assist in all the business of the SOCIETY and the several Committees. The members have also the privilege of recommending two persons as auditors at the meetings of the SOCIETY; and, by addressing a note to the housekeeper, of introducing their friends to examine the various Models, Machines, and Productions, in different branches of Arts, Manufactures, and Commerce, for which rewards have been bestowed; also to inspect the magnificent series of moral and historical Paintings, executed by the late J. BARRY, Esq. which, with some valuable Busts, Statues, &c. decorate the Great Room.

Members have the use of the Society's Library, which is valuable and annually increasing, from donations of scientific and useful books and engravings. The SOCIETY are highly sensible of the great importance of such acquisitions, and are happy to record them, with the names of the donors, in the Volume annually published of the SOCIETY's Transactions, to which the members are intitled.

Ladies are eligible as members of the SOCIETY, to all the Privileges thereof, and are alone entitled to vote by proxy at elections, through the medium of any gentleman who is a member, on his producing a written authority for the same.

The time appointed for admission to the Paintings or Models, is from ten to two o'clock, Sundays and Wednesdays excepted.

ORDERED, SOCIETY's HOUSE, ADELPHI, JUNE, 1st, 1815.

That the several candidates and claimants, to whom the society shall adjudge Premiums or Bounties, do attend at the Society's House in the Adelphi, on the last Tuesday in May, 1816, at eleven o'clock in the Morning precisely, to receive the same; that Day being appointed by the Society for the Distribution of their Rewards; And before that time no Premium or Bounty will be delivered, except to those who are about to leave the Kingdom.

In cases where the Society may think fit to admit excuses for not attending in person, deputies may be substituted to receive the Rewards, provided such Deputies are either members of the Society, or superior Officers thereof.

A LIST of the Officers of the SOCIETY, *and Chairmen of the several Committees.*

PRESIDENT.

Charles, Duke of Norfolk, F.R. and A.S.

VICE PRESIDENTS.

John, Duke of Bedford, F.A.S.
Hugh, Duke of Northumberland, F.R. and A.S.
G. G. L. Marquis of Stafford, K. G.
Jacob, Earl of Radnor, F.R. and A.S.
Robert, Earl of Liverpool, F.R.S.
Charles, Earl of Romney, F.R.S.
Hugh Earl Percy.
Hon. Robert Clifford, F. R. and A. S.
Sir Robert Peel, Bart, M.P.
Sir Watkin Lewes, Knt.
Sir Nathaniel Conant, Knt.
Thomas Pitt, Esq. F.A.S.
Richard Clark, Esq. Chamberlain, F. A. S.
Richard Powell, M.D,
John Christian Curwen, Esq.
Richard Wilson, Esq. F.A.S.

CHAIRMEN OF COMMITTEES,

Accounts.

William Lumley, Esq.
Abraham Osorio, Esq.

Correspondence and Papers.

William Tooke, Esq.
W. Thomas Brande, Esq. F.R.S.

Polite Arts.

J. Barber Beaumont, Esq. F.A.S.
R. H. Solly, Esq. F.R. and A. S.

Agriculture.

T. H. Andrew, Esq.
Charles Waistell, Esq.

Manufactures.

J. Pearsall, Esq.
W. Beckett, Esq.

Mechanics.

J Kenworthey Cooke, Esq.
Thomas Gill, Esq.

Chemistry.

Henry Coxwell, Esq.
G. D. Midgley, Esq.

Colonies and Trade.

William Lewis, Esq. F.L.S.
William Vaughan, Esq.

Miscellaneous Matters.

William Kirkby, Esq.
Daniel Beaumont, Esq.

SECRETARY, Charles Taylor, M.D.
ASSISTANT SECRETARY, Mr. Thomas Woodfall.
HOUSEKEEPER, Miss A.B. Cockings.
COLLECTOR, Mr. Robert Elwin.

PREMIUMS offered in 1815, *by the* SOCIETY *instituted at* London, *A. D.* 1754, *for the Encouragement of Arts, Manufactures, and Commerce.*

PREMIUMS IN AGRICULTURE.

THE candidates for planting all kinds of trees are to mention the nature of the soil, to produce certificates that the respective plantations are properly fenced and secured, and particularly to state the condition of the plants at the time of signing such certificates. Any information which the candidates for the following premiums may choose to communicate, relative to the methods made use of in forming the plantations, or promoting the growth of the several trees, or any other observations that may have occurred on the subject, will be thankfully received.

It is the intention of the Society that such lands only as are not calculated for the purposes of husbandry, should be employed for the purposes specified in these advertisements relative to plantations.

Article 1. ACORNS.

FOR having set between the first of October, 1813, and the first of April, 1814, the greatest quantity of land, not less than ten acres, with acorns, with or without seeds, cutttings, or plants of other trees, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

2. For the second greatest quantity of land, not less than five acres, set agreeably to the above conditions; the silver medal.

Certificates of setting agreeably to the above conditions, and that there are not fewer than three hundred young oaks on each acre, to be delivered to the Society on or before the last Tuesday in December, 1815.

3. RAISING OAKS. To the person who shall have raised, since the year 1811, the greatest number of oaks, not fewer than five thousand, either from young plants or acorns in order to secure a succession of oak timber in this kingdom; the gold medal.

4. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates that there were on the land at least the number of young oak trees required, in a thriving condition, two years after the planting, with an account of the methods pursued in making and managing the plantation, to be produced to the Society on or before the first Tuesday in January, 1816.

5. ASCERTAINING THE BEST METHOD OF RAISING OAKS. To the person who shall ascertain in the best manner by actual experiments, the comparative merits of the different modes of raising oaks for timber, either from acorns set on land properly dug or tilled, from acorns set by the spade or dibble, without digging, or tillage, either on a smooth surface, or among bushes, fern, or other cover; or from young plants previously raised in nurseries, and transplanted; regard being had to the expence, growth, and other respective advantages of the several methods; the gold medal.

The *accounts* and proper *certificates*, that not less than one acre has been cultivated in each mode, to be produced to the Society on or before the last Tuesday in Nov. 1815.

6. CHESNUTS. For having sown or set between the first of October, 1813, and the first of April, 1814, the greatest quantity of land, not less than six acres, with Spanish chesnuts, with or without seeds, cuttings or plants of other trees, adapted to such soil, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

7. For the second greatest quantity, not less than four acres; the silver medal.

Certificates of sowing or setting, agreeably to the above conditions, and that there are not fewer than three hundred chesnut plants in a thriving state, on each acre, to be delivered to the Society on or before the first Tuesday in January, 1816.

8. ELM. For having planted the greatest number of the English elm, not less than eight thousand, between the twenty-fourth of June, 1813, and the twenty-fourth of June, 1814, and for having effectually fenced and preserved the same, in order to raise timber; the gold medal.

9. For the second greatest number not less than five thousand; the silver medal.

Certificates of having planted agreeably to the above conditions, that the plants were in a healthy and thriving state, two years at least after making the plantation, and specifying the distance of the plants, to be delivered to the Society on or before the first Tuesday in April, 1816.

10. LARCH. For having planted out, between the twenty-fourth of June, 1812, and the twenty-fourth of June, 1813, the greatest number of larch trees, not fewer than five thousand, and for having effectually fenced and preserved the same, in order to raise timber; the gold medal.

11. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates of the number of plants, that they were in a healthy and thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1815.

N. B. The larch trees may be planted either mixed with other trees, or by themselves, as may best suit the convenience of the planter.

12. ASH. For having sown or set, in the year 1812, the greatest quantity of land, not less than six acres, with ash for timber, with or without seeds, cuttings, or plants, of such other trees as are adapted to the soil; the gold medal.

13. For the next greatest quantity, not less than four acres; the silver medal.

Certificates of the sowing or setting, agreeably to the above conditions, that there are not fewer than six hundred ash plants on each acre, in a thriving and healthy condition, two years at least after the sowing or setting, with a general account of the methods used in making the plantation; to be delivered to the Society on or before the last Tuesday in December, 1815.

14. Forest Trees. To the person who shall have enclosed and planted, or set, the greatest number of acres (not less than ten) of land, that is incapable of being ploughed such as the borders of rivers, the sides of precipices, and any land that has too many rocks, or that is not calculated to repay the expense of tillage, owing to the surface being too hilly, mountainous, or otherwise unfit for tillage, with the best sorts of forest trees, namely, oak, Spanish-chesnuts, ash, elm, beech, alder, willow, larch, spruce, and silver fir, with or without screens of Scotch fir adapted to the soil, and intended for timber trees, between the first of October, 1812, and the first of April, 1813; the gold medal.

15. For the second greatest quantity of land; not less than seven acres; the silver medal.

A particular *account* of the methods used in making and managing the plantations, the nature of the soil, the probable number of each sort of plants, together with proper *certificates* that they were in a healthy and thriving state two years at least after making the plantations, to be delivered to the Society on or before the second Tuesday in January, 1816.

N. B. With the above forest trees, the seeds, cuttings, or plants, of such other trees as are adapted to the soil, and proper for underwood, may or may not be intermixed.

16. Norway Fir Seedlings. To the person who shall have planted in the united kingdom, during the year 1814, the greatest number, not less than two thousand, of red wood and white wood, Norway fir seedling, at sufficient distances from each other to stand for timber trees; the gold medal.

Certificates of the number of plants, that they were in a thriving state two years at least, after they were planted out, with a general account of the method used in making the plantation, to be delivered to the Society, on or before the first Tuesday in December, 1816.

N. B. It is recommended to plant the seedlings of about three or four years growth and in a moderately good soil, somewhat sheltered; the wood from the district of Christiana is esteemed the best for carpenters' and joiners' use: and for spars and uppers the trees near to Long Sound are most valued.

17. Walnut Trees. For having planted the greatest number of walnut trees, not less than five hundred, between the 24th of June, 1813, and the 24th of June, 1814, and for having effectually fenced and preserved the same, in order to raise timber, the gold medal.

18. For the next greatest number, not fewer than three hundred; the silver medal.

Certificates of having planted agreeably to the above conditions, and that the plants were in a healthy and thriving state, two years at least after making the plantations, and specifying the distance of the plants from each other, to be delivered to the Society, on or before the first Tuesday in April, 1816.

19. Securing Plantations of Timber Trees and Hedge Rows. To the person who shall give to the Society the most satisfactory account, founded on experience, of the most effectual, and least expensive method of securing young plantations of timber trees, and hedge rows, from hares and rabbits, as well as sheep and large cattle, which at the same time shall be least subject to the depredations of wood-stealers; the silver medal.

The *accounts* and *certificates* of the efficacy of the method, to be produced to the Society on or before the last Tuesday in December, 1815.

20. Comparative Culture of Wheat, broad-cast, drilled and dibbled. For the best set of experiments, made on not less than twelve acres, four of which to be sown broad-cast, four drilled, and four dibbled, the two latter in equidistant rows, in order fully to ascertain which is the most advantageous mode of cultivating wheat; the gold medal.

It is required that every operation and expense of each mode of culture be fully described; and that proper certificates of the nature and condition of the land on which the experiments were made, together with an *account* of the produce of the corn, the weight per bushel, and also of the straw, be produced to the Society on or before the first Tuesday in February, 1816.

21. Beans. To the person who, in the year 1815, shall discover and cultivate, either by the drill or dibbling method, on not less than five acres, a species of horse-beans or tick beans, that will ripen their seeds before the 21st of August; the silver medal.

It is required that a particular account of the bean, the cultivation, and the expence attending it, with proper *certificates* of the nature and condition of the land on which the experiments were made, together with an *account* of the produce, the weight per Winchester bushel, and a sample of not less than a peck, be produced to the Society on or before the last Tuesday in December, 1815. It is apprehended that if a bean should be brought into cultivation with the habits of the hotspur, or other early peas, that it would in a great measure escape the danger arising from the collier-insect, or other insects, and allow more time for the farmers to till the land for the subsequent crop of wheat. The *accounts* and *certificates* to be delivered on or before the last Tuesday in December, 1815.

22. PARSNIPS. To the person who in the year 1815, shall cultivate the greatest quantity of land, not less than five acres, with parsnips, for the particular purpose of feeding cattle or sheep; the gold medal.

Certificates of the quantity of land so cultivated, with a particular *account* of the nature of the soil and weight of the produce on sixteen perches, and also of the condition of the cattle or sheep fed with the parsnips, and the advantages resulting from the practice, to be produced to the Society on or before the second Tuesday in February, 1816.

23. BUCK WHEAT. To the person who shall cultivate the greatest quantity of land with buck wheat, not less than thirty acres; the gold medal.

It is required that the time of sowing and reaping be noticed; also a particular *account* of the species, cultivation, and expense attending it, the manner of reaping it, thrashing it, and housing the grain; with proper *certificates* of the nature and condition of the land on which the experiments were made, and the name of the crop, if any, which the same land bore the preceding year, together with an *account* of the produce, and a sample of the seed, not less than a quart, be produced to the Society on or before the second Tuesday in January, 1816.

24. For the next greatest quantity, not less than fifteen acres, on similar conditions; the silver medal.

Information respecting its application to the feeding of cattle, hogs, and poultry, and other of its uses, is also desired. It is known to be particularly serviceable in furnishing honey to bees.

25. BEES, WAX, AND HONEY. To the person who shall erect, previous to the first day of September, 1815, an apiary containing the greatest number of hives or boxes stocked with bees, not less than one hundred; the silver medal, or twenty guineas.

26. For the next greatest number, not fewer than fifty stocks; ten guineas.

Proper *certificates* of the number of stocks, and that they have been in the possession of the claimant during the preceding summer, to be produced to the Society on or before the first Tuesday in March, 1816.

It is expected that the claimant will give such particular information on the subject, as may tend to benefit the public, and enable other persons to keep bees to advantage; also that improved methods be made use of in their management, and particularly that the bees be not destroyed in order to obtain their honey and wax.

27. RAISING GRASS SEEDS. To the person who shall raise the greatest quantity of each of any of the following named grass seeds, *viz.*—Meadow fox-tail (alopecurus pratensis), sweet-scented vernal grass (anthoxanthum odoratum), Timothy grass (phleum pratense), meadow fescue grass (festuca) pratensis), smooth-stalked meadow grass (poa pratensis), rough-stalked meadow grass (poa trivalis); the silver medal.

It is required that *certificates* from persons who have viewed them in a proper state, to identify that they are one or other of the seeds above-mentioned, indicating clearly the particular species, and noticing the quantity produced of such seeds, free from weeds or mixture of other grasses, together with proper samples of the seeds, be produced to the Society on or before the first day of February, 1816.

28. PRESERVING TURNIPS. To the person who shall discover to the Society the best and cheapest method of preserving turnips perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle during the months of February, March, and April; the gold medal.

It is required that a full and accurate *account* of the method employed, and the expense attending the process, together with *certificates* that the produce of four acres at the least have been preserved according to the method described, and applied to the feeding of sheep and neat cattle; that the whole were drawn out of the ground before the first day of February, in order to clear the greater part of it previous to its being prepared for corn, and to save the soil from being exhausted by the turnips; and also of the weight of an average sixteen perches of the crop; be produced to the Society on or before the last Tuesday in December, 1815.

29. For the next in quantity and merit, on not less than two acres; the silver medal.

30. PRESERVING CABBAGES. To the person who shall discover to the society the best and cheapest method of preserving drum-headed cabbages perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle during the months of February, March, and April; the gold medal.

31. For the next in quantity and merit, on not less than two acres; the silver medal.

Conditions the same as for preserving turnips, Art. 28.—And the *accounts* to be produced on or before the last Tuesday in December, 1815.

32. PRESERVING CARROTS, PARSNIPS, OR BEETS. To the person who shall discover to the Society the best and cheapest method of preserving carrots, parsnips, or beets, perfectly sound, and in every respect fit for the purpose of supporting horses, and fattening sheep and neat cattle, during the months of February, March, and April; the gold medal.

Conditions the same as for preserving turnips, Art. 28.—And the *accounts* to be delivered in on or before the last Tuesday in December, 1815.

33. For the next in quantity and merit, on not less than two acres; the silver medal.

34. POTATOES. To the person who shall, in the year 1815, cultivate the greatest quantity of land which has not been used for the cultivation of potatoes for the space of twelve years past, not less than fifty acres;

with potatoes of such qualities as to be fit for the use of the table in the months of April, May, and June, after their growth the preceding year; the gold medal, or thirty guineas.

35. For the next greatest number, not less than twenty acres; the silver medal, or fifteen guineas.

Proper *certificates* along with other necessary particulars, to be delivered in to the Society on or before the first Tuesday in April, 1816.

36. These premiums are extended one year further, on similar conditions.

37. PRESERVING POTATOES. To the person who shall discover to the Society the best and cheapest method of preserving potatoes, two or more years, perfectly sound, without vegetating, and in every other respect fit for the purpose of sets and the use of the table, and consequently of supporting and fattening cattle; the gold medal, or thirty guineas.

It is required that a full and accurate *account* of the method employed, and the expense attending the process, with *certificates* that one hundred bushels at the least have been preserved according to the method described, and that one or more bushels of the same potatoes have been set, and produced a crop without any apparent diminution of their vegetative power, and also that they have been used at table, with entire satisfaction to the person who eat of them, together with a sample of one bushel, be sent to the Society on or before the last Tuesday in December, 1815.

38. For the next *greatest quantity*, not less than fifty bushels; the silver medal.

39. MAKING MEADOW-HAY IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of making meadow-hay in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than fifty-six pounds of the hay; and *certificates* that at least the produce of six acres of land has been made according to the method described, and that the whole is of equal quality with the sample; to be produced on or before the first Tuesday in January, 1816.

40. HARVESTING CORN IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of harvesting corn in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than two sheaves of the corn, and *certificates* that at the least the produce of ten acres has been harvested according to the method described, and that the whole is of equal quality with the samples, to be produced on or before the first Tuesday in January, 1816.

41. GAINING LAND FROM THE SEA. To the person who shall produce to the Society an account, verified by actual experiment, of his having gained the greatest quantity of land from the sea, not less than fifty acres, on the coast of Great Britain and Ireland; the gold medal.

Certificates of the quantity of land, and that the experiments were begun after the first of January, 1810, to be produced to the Society on or before the last Tuesday in December, 1815.

42. The same premium is extended one year further.

Certificates to be produced on or before the last Tuesday in December, 1816.

43. IMPROVING LAND LYING WASTE. For the most satisfactory *account* of the best method of improving any one of the following soils, being land lying waste and uncultivated, *viz.* clay, gravel, sand, chalk, peat earth, or bog, verified by experiments on not less than fifty acres of land; the gold medal.

44. For the next greatest quantity, not less than thirty acres; the silver medal.

It is required, that the land, before such improvement, be absolutely uncultivated, and in a great measure useless, and that, in its improved state, it be enclosed, cultivated, and divided into closes.

Certificates of the number of acres, of the quality of the land so improved, with a full *account* of every operation and expense attending such improvement, the state it is in as to the proportion of grass to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1816.

45. MANURES. For the most satisfactory set of experiments, to ascertain the comparative advantages of the following manures, used as top-dressings on grass and corn land, *viz.* soot, coal-ashes, wood-ashes, lime, gypsum, night-soil, or any other fit article; the gold medal.

It is required that the above experiments be made between two or more of the above-mentioned manures, and that no less than two acres of land be dressed with each manure.

An *account* of the nature of the soil quantity, and expense of the manure and crops, with *certificates*, to be produced on or before the last Tuesday in February, 1816.

46. RAISING WATER FOR THE IRRIGATION OF LAND. To the person who shall discover to the Society the cheapest and most effectual method of raising water in quantities sufficient to be beneficially employed for the purpose of irrigating land, superior to, and cheaper than any other method now in use, the gold medal, or fifty guineas.

A model, on a scale of one inch to a foot, with *certificates* that a machine at large, on the same construction, has been used, specifying the quantity of water delivered in gallons per hour, and the height to which it

was raised, to be produced to the Society on or before the first of March, 1816.

47. PARING PLOUGH. To the person who shall invent and produce to the Society a machine or plough for the purpose of paring land preparatory to burning, superior to any hitherto known, or in use for such purpose, and to be worked by not more than one man and two horses; the silver medal, or twenty guineas.

The machine, and *certificates* that at least three acres have been pared by it in a proper manner, to be produced to the Society on or before the first of January, 1816.

48. MACHINE FOR DIBBLING WHEAT. To the person who shall invent a machine, superior to any hitherto known or in use, to answer the purpose of dibbling wheat, by which the holes for receiving the grain may be made at equal distances and proper depths; the silver medal and ten guineas.

The *machine*, with *certificates* that at least three acres have been dibbled by it, to be produced to the Society on or before the second Tuesday in January, 1816.

49. MACHINE FOR REAPING OR MOWING CORN. For inventing a machine to answer the purpose of mowing or reaping wheat, rye, barley, oats, or beans, by which it may be done more expeditiously and cheaper than by any method now practised, provided it does not shed the corn or pulse more than the methods in common practice, and that it lays the straw in such a manner that it may be easily gathered up for binding; the gold medal.

The *machine*, with *certificates* that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1815. Simplicity and cheapness in the construction of this and the preceding machine, will be considered as principal parts of their merit.

50. THRASHING MACHINE. To the person who shall invent a machine by which corn of all sorts may be thrashed more expeditiously, effectually, and at a less expense, than by any method now in use; the gold medal.

The *machine*, or a model, with proper *certificates* that such a machine has been usefully applied, that at least thirty quarters have been thrashed by it, and of the time employed in the operation, to be produced to the Society on or before the last Tuesday in February, 1816.

51. DESTROYING THE GRUB OF THE COCKCHAFER. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the grub of the cockchafer, or of preventing or checking the destructive effects which always attend corn, peas, beans, and turnips, when attacked by those insects; the gold medal.

The *accounts*, with proper *certificates*, to be produced on or before the first Tuesday in January 1816.

52. DESTROYING WORMS. To the person who shall discover to the Society, an effectual method, verified by repeated and satisfactory trials, of destroying worms, or of preventing the destructive effects they occasion on corn, beans, peas, or other pulse; the silver medal.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1816.

53. DESTROYING THE FLY ON HOPS. To the person who shall discover to the Society an easy and efficacious method of destroying the fly on hops, superior to any hitherto known or practised, on not less than four acres of hop ground; the gold medal.

Accounts and *certificates* to be delivered to the Society on or before the first Tuesday in February, 1816.

54. PREVENTING THE BLIGHT, OR RAVAGES OF INSECTS, ON FRUIT TREES AND CULINARY PLANTS. To the person who shall discover to the Society the most effectual method of preventing the blight or ravages of insects on fruit-trees and culinary plants, superior to any hitherto known or practised, and verified by actual and comparative experiments; the silver medal.

The *accounts*, with proper *certificates*, to be delivered to the Society on or before the second Tuesday in December, 1815.

55. CURE OF THE ROT IN SHEEP. To the person who shall discover to the Society the best and most effectual method of curing the rot in sheep, verified by repeated and satisfactory experiments; the gold medal.

It is expected that the candidates furnish accurate *accounts* of the symptoms and cure of the disease, together with the imputed cause thereof, and the actual or probable means of prevention, which, with proper *certificates*, must be delivered to the Society on or before the first Tuesday in February, 1816.

56. CURE OF THE FOOT-ROT IN SHEEP. To the person who shall discover to the Society the best and most effectual method of curing the foot-rot in sheep; the silver medal.

It is required that the cure be ascertained by repeated and satisfactory experiments, and the method of performing it be verified, by proper *certificates* delivered to the Society on or before the first Tuesday in February, 1816.

57. PREVENTING THE ILL EFFECTS OF FLIES ON SHEEP. To the person who shall discover to the Society the most effectual method of protecting sheep from being disturbed and injured by flies; the silver medal.

It is required that the method be ascertained by repeated experiments, and that a *certificate* of its efficacy be delivered to the Society on or before the first Tuesday in December, 1815.

58. PROTECTING SHEEP. To the person who, in the year 1814, shall protect the greatest number of sheep, not fewer than one hundred, by hovels, sheds, or any other

means and give the most satisfactory account, verified by experiment, of the advantages arising from the practice of protecting sheep from the inclemency of the weather, by hovels, sheds, or any other means; the gold medal.

A particular *account* of the experiments made, with the advantages arising therefrom, together with the expense, and *certificates* of its utility, to be produced to the Society on or before the first Tuesday in March, 1816.

N. B. It is required that the *certificates* shall specify the length of time the sheep were so protected, and the manner in which they were maintained during that time; together with the general method of managing them.

59. CULTURE OF HEMP. The Society wishing to encourage the growth of hemp for the use of the navy in every part of the united Empire, offer to the person who shall sow with hemp, in drills at least eighteen inches asunder, the greatest quantity of land in any part of the united Empire, not less than fifty acres statute measure, in the year 1814, and shall at the proper season cause to be plucked the summer hemp, (or male hemp bearing no seed) and continue the winter hemp (or female hemp bearing seed) on the ground until the seed is ripe; the gold medal.

60. To the person who shall sow with hemp, in drills at least eighteen inches asunder, the next greatest quantity of land in any part of the united Empire, not less than twenty-five acres, statute measure, in the year 1815, and shall at the proper season cause the same to be plucked as abovementioned; the silver medal.

Certificates of the number of acres, of the distance of the drills, of the plucking of the hemp, with a general *account* of the soil, cultivation, and produce, to be delivered to the Society, along with fourteen pounds of the hemp and two quarts of the seed, on or before the second Tuesday in January, 1816.

61. FEEDING OF CATTLE. For the best experiments on stall feeding of cattle (not less than five head) to be continued for the space of twelve months, in order to prove the earliest maturity and greatest propensity to fatten, of the most approved breeds of cattle in Great Britain, specifying the nature of the food given, together with the daily consumption of each beast, with its weekly increase in weight, and such other observations as may be deemed of consequence; the gold medal.

A full *account* of the methods employed, and of the expenses attending the same, and *certificates* of the sundry matters stated, to be produced on or before the second Tuesdayin January, 1816.

PREMIUMS FOR DISCOVERIES AND IMPROVEMENTS IN CHEMISTRY, DYEING, AND MINERALOGY.

62. PRESERVING SEEDS OF VEGETABLES. For the best method of preserving the seeds of plants in a state fit for vegetation a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial, to be communicated to the Society on or before the last Tuesday in December, 1815; the gold medal, or thirty guineas.

63. PREVENTING THE DRY-ROT IN TIMBER. To the person who shall discover to the Society the cause of the dry-rot in timber, and disclose a certain method of prevention superior to any hitherto known; the gold medal, or thirty guineas.

The *accounts* of the cause and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the last Tuesday in Dec. 1815.

64. PRESERVING SALTED PROVISIONS FROM BECOMING RANCID OR RUSTY. To the person who shall discover to the Society the best, cheapest, and most efficacious method of preserving salted provisions from becoming rancid or rusty; the gold medal, or thirty guineas.

A full *description* of the method, with proper *certificates* that it has been found on repeated trials to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1816.

65. REFINING WHALE OR SEAL OIL. For disclosing to the Society an effectual *method of purifying* whale or seal oil from the glutinous matter that incrusts the wicks of lamps, and extinguishes the light though fully supplied with oil; the gold medal, or fifty guineas.

It is required that the whole of the process be fully and fairly disclosed, in order that satisfactory experiments may be made by the Society to determine the validity of the claim; and *certificates* that not less than twenty gallons have been purified according to the process delivered in, together with two gallons of the oil in its unpurified state, and two gallons so refined, to be produced to the Society on or before the second Tuesday in February, 1816.

66. MANUFACTURING TALLOW CANDLES. To the person who shall discover to the Society a method of hardening or otherwise preparing tallow, so that candles may be made of it which will burn as clear and with as small a wick as wax candles, without running, and may be afforded at a less expense than any at present made with spermaceti; the gold medal, or fifty guineas.

Certificates that 112lb. of such tallow have been made into candles, and 12lb. of the candles made thereof, to be produced to the Society on or before the second Tuesday in January, 1816.

67. CANDLES FROM RESIN, OR OTHER SUBSTANCES. To the person who shall discover to the Society the best method of

making candles of resin, or any other substance, fit for common use, at a price much inferior to those made of tallow only; the gold medal, or thirty guineas.

Six pounds at least of the candles so prepared, with an *account* of the process, to be delivered to the Society on or before the last Tuesday in December, 1815.

68. INCREASING STEAM. To the person who shall invent and discover to the Society a method, verified by actual experiments, of encreasing the quantity or force of steam in steam engines, with less fuel than has hitherto been employed, provided that in general the whole amount of the expenses in using steam engines may be considerably lessened; the gold medal, or thirty guineas.

To be communicated to the Society on or before the first Tuesday in January, 1816.

69 SUBSTITUTE FOR TAR: To the person who shall invent and discover to the Society the best substitute for Stockholm tar, equal in all its properties to the best of that kind, and prepared from materials the produce of the United Kingdom and its Colonies; the gold medal, or one hundred guineas. A quantity of the substitute, not less than one hundred weight, with *certificates* that at least one ton has been manufactured and that it can be afforded at a price not exceeding that of the best foreign tar, together with an *account* of the process, to be delivered to the Society on or before the first Tuesday in March, 1816.

N. B. Considerable quantities of tar are produced in Sweden and Norway from the roots of fir trees burnt for that purpose.

70. TURPENTINE FROM THE SCOTCH FIR OR PINUS SYLVESTRIS. For the greatest quantity of turpentine, not less than two hundred weight, prepared in Great Britain, from that species of fir, called the Scotch fir, or Pinus sylvestris, Linn.; the gold medal.

Certificates of the turpentine being prepared from such trees of British growth, together with fifty-six pounds of the turpentine, to be delivered to the Society on or before the second Tuesday in January, 1816.

71. For the next greatest quantity prepared, not less than one hundred weight on similar conditions; the silver medal.

N. B. The Society being in possession of the method practised for extracting turpentine from trees whilst growing, and of samples so procured, information will be given upon that subject, on application for that purpose, at the Society's house.

72. PREPARATION OF TAN. To the person who shall prepare, in the most concentrated form, so as to be easily portable, and at a price applicable to the purposes of manufacturers, the largest quantity, not less than one hundred weight of the principle called *tannin*, which abounds in oak bark and many other vegetable substances; the gold medal, or thirty guineas.

Certificates of the superior quality of the quantity so prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1816.

73. INDELIBLE INK. To the person who shall discover to the Society a method of making a black ink proper for writing, superior to any at present known, indestructible by chemical applications, and not dearer than that which is now in common use; the silver medal, or fifteen guineas.

Certificates that not less than two gallons of such ink have been actually prepared, and found to possess the qualities abovementioned, with a full detail of the process of making it, and two quarts of the ink to be delivered to the Society on or before the second Tuesday in January, 1816.

74. PREPARATION OF A RED STAIN FOR COTTON CLOTH. To the person who shall communicate to the Society the cheapest and most effectual method of printing or staining cotton cloths with a red colour, by an immediate application of the colouring matter to the cloth, equally beautiful and durable with the red colours now generally procured from decoctions of madder; the gold medal, or fifty guineas.

Certificates that the above process has been advantageously used on ten pieces of calico, each twenty-one yards or upwards in length; one piece of the calico so printed, a quart of the colour in a liquid state, and a full *account* of the preparation and application, to be produced to the Society on or before the second Tuesday in January, 1816.

75. PREPARATION OF A GREEN COLOUR FOR PRINTING COTTON CLOTH. To the person who shall communicate to the Society the best and cheapest method of printing with a full green colour on cotton cloth, by an immediate application of the colouring matter from a wooden block to the cloth, equally beautiful and durable as the colours now formed from the complicated process of the decoction of weld on alumine, and the solutions of indigo by earths or alkaline salts; the gold medal, or fifty guineas.

Certificates and conditions as for Premium 74.

76. RENDERING MUSLIN LESS COMBUSTIBLE. To the person who shall discover to the Society a method of rendering muslin less combustible, to be effected by a cheaper and more effectual mode than any hitherto known; the silver medal.

Specimens of the muslin so prepared, with a full account of the process employed for the purpose, to be produced to the Society on or before the first Tuesday in February, 1816.

N. B. It is expected that the means employed shall neither injure the quality of the muslin, stain it, nor damage any print or dye with which it may be coloured.

77. WHITE SUBSTANCE FOR THE BASIS OF PAINT. To the person who shall produce to the Society the best white substitute, superior to any hitherto known, for the basis of paint, equally proper for the purpose as the white-lead now employed; such substitute not to be of a noxious quality, and to be afforded at a price not materially

higher than that of white-lead, the gold medal, or one hundred guineas.

A quantity of the substitute, not less than 50lb. weight, with an *account* of the process used in preparing it, and *certificates* that at least one hundred weight has been manufactured, to be produced to the Society on or before the first Tuesday in January, 1816.

78. RED PIGMENT. To the person who shall discover to the Society a full and satisfactory process for preparing a red pigment, fit for use in oil or water, equal in tone and brilliancy to the best carmines and lakes now known or in use, and perfectly durable; the gold medal, or fifty guineas.

One pound weight of such colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1816.

N. B. It is not required that the colour should resist the action of fire, or chemical applications, but remain unaltered by the common exposure to strong light, damps, and noxious vapours.

79. ULTRAMARINE. To the person who shall prepare an artificial ultramarine, equal in colour, brilliancy, and durability, to the best prepared from lapis lazuli, and which may be afforded at a cheaper rate; the gold medal, or thirty guineas.

The conditions are the same as in the preceding Premium for the red pigment.

80. BLUE-PIGMENT FROM IRON. To the person who shall invent, and discover to the Society the best blue pigment from iron, superior to Antwerp or Prussian blue in colour and durability, fit for use in oil or water, which may be afforded at a cheap rate; the gold medal, or thirty guineas.

One pound weight of the colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1815.

N. B. It appears from the analysis of lapis lazuli by Klaproth, and the experiments of Guyton, (related in the Annales de Chemie) that ultramarine is a blue sulphuret of iron, and that a blue substance much resembling it is constantly found amongst the scoriæ of blast furnaces where iron is reduced.

81. DESTRUCTIVE EFFECTS FROM MOTHS. To the person who shall discover to the Society a cheap, easy, and effectual method verified by repeated and satisfactory trials, of preventing the destructive effects occasioned by moths and other insects, in furs, woollens, and other articles, superior to any hitherto known or practised; the silver medal, or fifteen guineas.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1816.

82. STATUARY MARBLE. To the person who shall discover, within great Britain or Ireland, a quarry of white marble fit for the purposes of statuary, and equal in all respects to those kinds now imported from Italy; the gold medal, or one hundred guineas.

A block of at least three feet in length, two in height, and two in width, with an account of the situation of the quarry, and *certificates* of its possessing considerable extent, to be produced to the Society on or before the first Tuesday in February, 1816.

N. B. In order to prevent useless expense or trouble to the claimant in forwarding so large a block, the Society will be ready to examine any smaller specimen of the marble, and express their opinion of its value to the candidate before the block required by the above premium is produced.

83. PREPARATION OF SULPHURIC ACID, FROM SULPHUR, WITHOUT THE USE OF ANY NITRIC SALT. To the person who shall prepare the largest quantity, (not less than one ton) of sulphuric acid from sulphur without any nitric salt, of a specific gravity not inferior to the best sulphuric acid of commerce; the gold medal, or fifty guineas.

Certificates that not less than the above quantity of such an acid has been prepared, together with a sample, to be produced to the Society on or before the first Tuesday in January, 1816.

84. PREPARATION OF ANY ALKALINE OR EARTHEN NITRATE. To the person who shall prepare, in Great Britain, the largest quantity, not less than one hundred weight, of any salt of nitric acid, with either earths or alkalies, by a method superior to, and as cheap as those hitherto practised; the gold medal, or one hundred guineas.

Certificates of the above quantity having been prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1816.

85 FINE BAR IRON. To the person, in Great Britain, who shall make the greatest quantity of bar-iron, not less than ten tons, with coak, from coak pigs, equal in quality to the best iron imported from Sweden or Russia, and as fit for being converted into steel; the gold medal, or fifty guineas.

Samples, not less than one hundred weight, with *certificates* that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1816.

86. PRESERVING IRON FROM RUST. To the person who shall invent and discover to the Society a cheap composition, superior to any now in use, which shall effectually preserve wrought iron from rust; the gold medal, or fifty guineas.

A full description of the method of preparing the composition, with *certificates* that it has stood at least two years unimpaired, being exposed to the atmosphere during the whole time, to be produced to the Society, with ten pounds weight of the composition, on or before the first Tuesday in January, 1816.

87. REFINING BLOCK TIN. To the person who shall discover to the Society the best method of purifying or refining block-tin, so as to render it fit for the finest purposes to which grain-tin is now applied,

and not higher in price; the gold medal, or fifty guineas.

Certificates that not less than three tons have been so refined or purified, with a full detail of the process, and a quantity, not less than one hundred weight, of the tin so refined, to be produced to the Society on or before the first Tuesday in January, 1816.

88. GLAZING EARTHEN-WARE WITHOUT LEAD. To the person who shall discover to the Society, the cheapest, safest, most durable, and most easily fusible composition, fit for the purpose of glazing the ordinary kinds of earthen-ware, without any preparation of lead, and superior to any hitherto in use; the gold medal, or thirty guineas.

Specimens of the ware so glazed, with proper *certificates* of its having succeeded and a sample of the materials made use of, to be produced to the Society on or before the first Tuesday in February, 1816.

89. COBALT, ZAFFRE, AND SMALT. For the discovery of a mine of cobalt in Great Britain or Ireland, that will produce a sufficient quantity of the mineral, of good quality, to supply a manufacture of Zaffre, or smalt; the gold medal, or thirty guineas.

Certificates that at least one ton of the ore has been raised; and five pounds of Zaffre, and ten pounds of smalt made therefrom, to be produced to the Society on or before the last Tuesday in March, 1816.

N. B. It appears from the minutes of the Society, in 1755, that a discovery of cobalt was made at or near Truro in Cornwall, but not a sufficient quantity of ore found to answer the desired purpose.

90. REFINING COPPER FROM THE ORE. To the person who shall discover to the Society the best method of separating, purifying, and refining copper from the ore, so as to render it fit for the finest purposes to which fine copper is now applied, and by a process superior to any hitherto known or in use, and not higher in price; the gold medal, or fifty guineas.

Certificates that not less than three tons have been so prepared or refined, and a quantity not less than one hundred weight of the copper so refined, to be produced to the Society on or before the first Tuesday in February, 1816.

91. PREVENTING THE ILL EFFECTS OF SMELTING ORES. To the person or persons who shall invent and discover to the Society the most effectual method or methods of preventing the ill effects arising to vegetation and animal life, from the sulphureous arsenical, or other noxious fumes disengaged in smelting the ores of copper, zinc, lead, tin, iron, &c. in the large way, and if possible, of converting those pernicious fumes to useful purposes, in a manner superior to any hitherto known or in use; the gold medal, or fifty guineas.

It is required that a full *account* of the process employed, with *certificates* of its being successfully carried into effect, be produced to the Society on or before the first Tuesday in March, 1816.

92. MINERALOGICAL MAP OF ENGLAND AND WALES. To the person who shall construct and publish a complete series of mineralogical County maps of England and Wales, on a scale of not less than two and a half miles to an inch, containing an account of the situation of the different mines therein, and describing the kinds of minerals thence produced; the gold medal or fifty guineas.

Certificates of the accuracy of such maps, together with the maps, to be produced to the Society on or before the first Tuesday in February, 1816. The maps to remain the property of the Society.

93. MINERALOGICAL MAP OF IRELAND. To the person who shall complete and publish an accurate mineralogical map of Ireland on a scale of not less than five miles to an inch, containing an account of the matters described in the above premium; the same premium on similar conditions.

94. MINERALOGICAL MAP OF SCOTLAND. The same premium is offered for a mineralogical map of Scotland, on similar conditions.

95. NATURAL HISTORY. To the author who shall publish, in the year 1815, the natural history of any county in the united kingdom; the gold medal, or fifty guineas.

It is required that the several natural productions, animal, vegetable, and mineral, peculiar to the county, or found therein be carefully and scientifically arranged and described, in order that the public may be enabled to judge what arts or manufactures are most likely to succeed in such county. The work to be delivered to the Society on or before the last Tuesday in January, 1816, and a copy to be the property of the Society.

PREMIUMS IN POLITE ARTS.

96. HONORARY PREMIUMS FOR DRAWINGS BY NOBILITY. For the best original drawing of any kind, by young gentlemen under the age of twenty-one, sons or grandsons of peers or peeresses in their own right, of Great Britain or Ireland; the gold medal.

97. For the best copy; the silver medal.

98—99. The same premiums will be given on the like conditions, to young ladies, daughters or grand-daughters of peers or peeresses in their own right of Great Britain or Ireland.

100. HONORARY PREMIUMS FOR DRAWINGS BY GENTLEMEN. For the best original drawing of any kind, by young gentlemen under the age of twenty-one; the gold medal.

101. For the best copy; the silver medal.

102—103. The same premiums will be given for drawings by young ladies.

N. B. As the foregoing honorary premiums are intended only for such of the nobility and gentry as may hereafter become patrons or patronesses of the arts; persons professing any branch of the polite arts, or

any business dependent on the arts of design, or the sons and daughters of such persons, will not be admitted candidates in the above classes, including 96 to 103.

104. PEN DRAWING OF A HEAD. For the best pen drawing of the head of Homer marked No. 33, in the British Museum, not less than twelve inches in height; the silver Isis medal.

105. DRAWINGS OF THE HAND AND FOOT. For the best drawing, with a pen, of the human hand and foot; the size of life or larger; the several parts marked with anatomical accuracy; the silver Isis medal.

106. DRAWINGS OF OUTLINES. For the best outline after the plaster cast of the Apollo Belvidere, by persons of either sex, under the age of twenty-one, the figure not less than eighteen inches; the silver medal.

107. DRAWINGS. For the best finished drawing of the statue of the Venus, No. 8, Room 2, in the British Museum; the size of the drawing not less than eighteen inches, by persons under twenty-one years of age; the silver medal.

N. B. Those artists who are inclined to make trial for the premiums in drawing of the Venus, or the head of Homer, (with permission of the trustees) at the British Museum, No. 25, Room 3, may be informed by the Secretary of this Society, of the proper mode of applying for that permission.

108. PERSPECTIVE DRAWINGS OF MACHINES. For the best perspective drawings of machines, by persons under twenty-one years of age; the silver medal.

109. DRAWINGS OF LANDSCAPES. For the best drawings, in water colours, of a landscape after nature, not less than eighteen inches by twelve, by persons of either sex, under twenty-one years of age; the silver medal.

110. HISTORICAL DRAWINGS. For the best historical drawing, being an original composition of three or more human figures, the height of the principal figure not less than eight inches, by persons of either sex, under twenty-one years of age, the gold medal. medal.

111. For the next in merit; the gold Isis medal, on similar conditions.

112. PREMIUMS FOR DRAWINGS IN GENERAL. For the best original drawing of any kind, by persons of either sex, under the age of twenty-one; the gold Isis medal.

112.* For the best copy; the silver medal.

113. ARCHITECTURAL DESIGNS. For the best original design of a British Senate House, consisting of plan, elevation, and section, each to be the size of double elephant; the gold medallion; the drawing to remain the property of the Society.

114. For the next in merit the silver medallion, on similar conditions.

The following inscriptions to be engraved on these medallions; *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, Esq. of Hampstead.*

115. PAINTINGS IN OIL. For the best painting in oil, of a landscape after nature, the size not less than thirty-six by twenty-eight inches; by persons of either sex, under twenty-five years of age; the gold Isis medal. Each candidate must mention whence the view was taken.

116. MARINE PAINTING. For the best original painting in oil of a marine subject, the size not less than thirty-six by twenty-eight inches, by persons of either sex, under twenty-five years of age, the gold Isis medal.

117. PLASTER CAST. For the best original model of a group, not less than three figures; the gold medal.

117.* For the next in merit, the gold Isis medal.

118. For a single figure, the silver medal on similar conditions.

A cast from the model in each case to remain the property of the Society, and the principal figure to be one foot high.

119. BRONZES. For the best drapery figure or group cast in bronze; if a single figure, not less than twelve inches high, and if a group, not less than nine inches; and which will require the least additional labour to repair, along with a full explanation of the process of making it; the gold medal, or the silver medal and twenty guineas.

120. ETCHING OF AN HISTORICAL SUBJECT. For the best free etching in historical composition from a picture of eminence; the gold Isis medal.

121. ETCHING OF A LANDSCAPE. For the best free etching in landscape composition, from a picture of eminence; the silver medal.

122. HISTORICAL ENGRAVING. For the best finished engraving in historical composition; the gold medal.

123. LANDSCAPE ENGRAVING. For the best finished engraving in landscape composition; the silver medal.

124. ENGRAVING OF A PORTRAIT. For the best finished engraving of a portrait, the gold Isis medal.

N. B. In the class of finished engravings the Society require an aquafortis impression, and a finished proof to be sent, and to remain with the Society.

125. ENGRAVING ON WOOD BLOCKS. For the best engraving on wood blocks of an historical subject, the size of the principal figure not less than six inches in height, and the block to be at least twelve inches by nine; the gold Isis medal.

Two or more impressions, with the block, to be produced to the Society. The impressions, but not the block, to remain the property of the Society.

126. MEDAL DIE ENGRAVING. For the best die engraving of the Head of Vulcan, or other design appropriate to the Society's rewards in the class of mechanics. The size of the die 1 inch 9-16 in diameter; the

gold medal. The die to be returned unless the Society should incline to purchase it.

127. For the best die engraving of one figure, or a group consisting of not more than three figures, after the engraver's own model; the gold medal.

The dies with two impressions or casts, and the model, in each claim for medal die sinking, are to be produced to the Society. The impressions or casts, but not the model or die, to remain the property of the Society.

128. Black Lead Pencils. To the person who shall discover to the Society an effectual method of freeing black lead from impurity, and improving its quality, for the purposes of the arts; the gold Isis medal.

N. B. The object of this premium is to obtain hard or soft pencils uniformly of a good quality.

CONDITIONS,

FOR THE POLITE ARTS.

All articles in the class of polite arts, whether for claims or bounties, are to be produced to the Society on or before the first Tuesday in March, 1816, and none can be received after that day.

No person who has gained the first premium in any class shall be admitted a candidate in a class of inferior age; and no candidate shall receive more than one premium in one year.

No person shall be admitted a candidate in any class, who has already obtained the first premium in that class.

No more than one performance in any class shall be received from the same candidate.

All performances (to which premiums or bounties are adjudged) shall remain with the Society until after the first Wednesday in June, 1815, when they will be re-delivered, unless mentioned in the premiums to the contrary.

No performance shall be admitted, that has obtained a reward from any other society, or academy, or been offered for that purpose.

It is required, that the subjects for which premiums are offered, be delivered in without the names, or any external intimation to whom they belong; that each particular subject be marked in what manner the claimant thinks fit, such claimant sending with it a paper sealed up, having on the outside a corresponding mark, with the number of the class in which it is meant that the claim should be made, and on the inside the claimant's name, residence, and age, which paper is not to be opened, unless the candidate be successful, or by a special vote of the Society.

To encourage real merit, and prevent attempts to impose on the Society, by producing drawings made or retouched by any other person than the candidate, the Society require a specimen of the abilities of each successful candidate, to be made under the inspection of the committee of Polite Arts.

All candidates in the Polite Arts are required to signify, on their drawings, whether the performances are originals or copies; and if possible to send the originals from which copies are taken.

All copies of drawings, &c. are to be on a different scale from the original.

The Society reserve to themselves the power of giving in all cases such part only of any premium as the performance shall be judged to deserve; or withholding the whole, if there be no merit.

PREMIUMS FOR ENCOURAGING AND IMPROVING MANUFACTURES.

129. Employment of Females. To the person who shall instruct and employ the greatest number of females, not fewer than twenty, in the making of men's clothes, particularly of woollen cloth, and not being for the use of the army or navy; the gold medal, or fifty guineas.

Certificates that the number of women above-mentioned, have been constantly so employed for at least three months, to be produced to the Society, on or before the last Tuesday in March, 1816.

130. For the next greatest number of women so employed, not fewer than ten; the silver medal, or fifteen guineas, on similar conditions.

131. Cloth from Hop-Stalks, Nettles, &c. To the person who shall produce to the Society the greatest quantity, not less than thirty yards of cloth, at least 27 inches wide, made in Great Britain or Ireland, of hop-stalks or bines, nettles, or other raw vegetable substances, the produce of Great Britain or Ireland, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as cloth of equal quality and appearance now made from hemp, flax, or cotton, and much finer in quality than any hitherto manufactured in England from hop-stalks, &c.; the gold medal, or thirty guineas.

One pound of the thread of which the cloth is made, and thirty yards of the cloth, together with proper *certificates* that the whole is manufactured from hop-stalks, or bines, &c. to be produced to the Society on or before the last Tuesday in December, 1815.

N. B. The Society is already in the possession of cloth made in England from hop-stalks or bines, and nettles, which may be inspected by application to the Housekeeper.

132. Sheep's Wool. To the persons who shall prove to the Society, that he has sold the largest quantity of Merino wool, or such wool as will answer the same purposes, being the produce of his own flock, in the

United Kingdom, for the purpose of being manufactured in superfine cloth, the quantity of wool not less than five hundred weight, in the year 1815; the gold medal.

Certificates, along with samples of the wool, and of the cloth manufactured from it, to be produced to the Society on or before the last Tuesday in March, 1816.

133. For the next greatest quantity, not less than two hundred and fifty pounds; the silver medal on similar conditions.

134. Hog's Bristles. To the person who shall prepare the greatest quantity of bristles, from swine bred in the united kingdom, equal in quality to those imported from Russia or Prussia, and at as cheap a rate; the silver medal, or fifteen guineas.

Certificates, that not less than one hundred weight have been so prepared, and a sample of not less than fourteen pounds of such bristles, to be produced to the Society on or before the last Tuesday in February, 1816.

135. Wicks for Candles or Lamps. To the person who shall discover to the Society, a method of manufacturing hop-stalks or bines, nettles, or any other cheap material, the growth of Great Britain, so as to render them equally fit for the purpose of supplying the place of cotton; for wicks of candles or lamps; the silver medal, or twenty guineas.

Samples, not less than five pounds weight, of the wick so prepared, to be produced to the Society on or before the last Tuesday in December, 1815, with *certificates* that the whole quantity is equal in quality to the sample.

136. Experiments to ascertain the proper Thickness of Wicks for Candles. To the person who shall make known to the Society the most satisfactory result of a series of experiments actually made by him to determine the best thickness of cotton wicks for candles, so as to obviate the defects of those commonly used; the silver medal, or ten guineas.

Certificates that not less than one hundred weight have been so made, and six pounds of the candles, to be produced to the Society, on or before the last Tuesday in February, 1816.

N.B. The intention in offering this premium, is to ascertain the proper thickness or bulk of the wick in proportion to that of the tallow, and to remove the unpleasant consequences and waste arising from the sparkling, or guttering of the candles in common use.

137. Paper from raw Vegetable Substances. To the person who shall, between the first of January, 1815, and the first of January, 1816, make the greatest quantity, and of the best quality, (not less than ten reams) of good and useful paper, from raw vegetable substances, the produce of Great Britain or Ireland, of which one hundred weight has not been used in manufacturing paper previous to January, 1814, superior to any hitherto manufactured from such substances, and which can be generally afforded, as cheap as paper of equal quality and appearance now made from rags; the silver medal or Twenty guineas.

N.B. The object of the Society being to add to the number and quantity of raw materials used in this manufacture, it is their wish to include every useful sort of paper, and to introduce such natural products as can be easily and cheaply procured in great quantities. The Society are in possession of two volumes containing a great variety of specimens of paper made from raw vegetable substances, viz. nettles, potatoe-haulm, poplar, hop-bines, &c. which volumes may be inspected by any person on application to the House-keeper.

Certificates of the making such paper, and one ream of the paper, to be produced on or before the second Tuesday in January, 1816.

138 Transparent Paper. To the person who shall discover to the Society a method of making paper from the pulp, that shall be perfectly transparent, and of a substance and body equal to foolscap that shall take and bear common writing-ink, with the same facility and correctness as writing paper generally in use; the silver medal, or twenty guineas.

Certificates of the making such paper, an *account* of the process, and one ream of the paper, to be produced on or before the second Tuesday in January, 1816.

139. Chintz Patterns for Calico-Printers. For the best original pattern in a new taste, of light and dark-ground chintz for garment work, or furniture, fit for the purpose of calico-printers, by persons of either sex; the silver medal. The pattern for which the premium is adjudged, to remain the property of the Society.

140. Copper-plate Patterns for Calico-Printers. For the best pattern, in a new style, fit for the purpose of calico-printers for garment-work or furniture; the silver medal. The pattern for which the premium is adjudged, to remain the property of the Society.

N.B. The patterns to be produced on or before the last Tuesday in February, 1816.

141. Gloves equal to French Kid. To the person who shall make known to the Society, a process equal to that of the French, or a superior one; for preparing, dying, and finishing the skins, verified by actual experiments, and the communication accompanied with at least a dozen pair of gloves made from skins so prepared in an equal or superior manner; the gold medal, or forty guineas.

Certificates from competent persons fully approving of the result of such experiments, together with the gloves and communication to be produced to the Society on or before the last Tuesday in March, 1816.

142. Improved Cat-Gut equal to Roman or Italian. To the person who shall discover to the Society the best method of manufacturing, in the United Kingdom of Great Britain and Ireland, the intestines of

sheep, lambs, goats, or of any other animals, into the article called cat-gut, equally strong, clear, smooth, even, and free from knots, as the best Roman and Italian strings, and at a price not exceeding what they are usually sold for in England; the gold medal, or thirty guineas.

Certificates that not less than fifty pounds weight have been so prepared by the claimant, with a full detail of the process, and samples of the articles of various thicknesses, to be produced to the Society, on or before the first Tuesday in February, 1816.

142. For the next greatest quantity, not less than twenty-five pounds; the silver medal, or twenty guineas, on similar conditions.

PREMIUMS IN MECHANICS.

143. GUNPOWDER MILLS. To the person who in the year 1815, shall invent and bring to perfection the most effectual method of so conducting the works of gunpowder mills in the business of making gunpowder, as to prevent explosion; the gold medal, or one hundred guineas.

Certificates and *accounts* of the method having been put in practice in one or more gunpowder mills in this kingdom, and that it promises, in the opinion of the best judges concerned in such works, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in Feb. 1816.

N.B. As an encouragement to persons to turn their thoughts to improvements of this nature, if any should be made on the present method of conducting the business of gunpowder making, which fall short of the total prevention of explosion, and they are sent to the Society for the sake of humanity, the papers so sent in will receive due consideration; and such bounty or reward will be bestowed as they may appear to merit.

144. TRANSIT INSTRUMENT. To the person who shall invent and produce to the Society a cheap and portable transit instrument which may easily be converted into a zenith sector, capable of being accurately and expeditiously adjusted for the purpose of finding the latitudes and longitudes of places, and superior to any portable transit instrument now in use; the gold medal, or forty guineas.

To be produced on or before the last Tuesday in January, 1816.

145. TAKING WHALES BY THE GUN-HARPOON. To the person who, in the year 1815, shall strike the greatest number of whales, not fewer than three, with the gun-harpoon; ten guineas.

Certificates of the striking such whales, and that they were actually taken in the year 1815, signed by the master, or by the mate when the claim is made by the master, to be produced to the Society on or before the last Tuesday in December, 1815.

146. *This Premium is extended one year further, on similar conditions.*

147. FAMILY MILL. To the person w shall invent and produce to the Society t best constructed mill for grinding corn f the use of private families, or parish poo the construction to be such as to render t working of the mill easy and expeditiou and superior to any hitherto in use; the go medal or thirty guineas.

The mill, and *certificates* of its havi been used to good effect, to be produc to the Society on or before the first Tuesd in February, 1816. Cheapness and simpl city will be considered as essential parts its merit; and the mill or a model, to r main with the Society.

148. MACHINE FOR RAISING COAL ORE, &c. &c. To the person who shall i vent a machine for raising coals, ore, & from mines, superior to any hitherto know or in use; and which shall produce th effect at a less expence than those alread known or in use; the gold medal or fift guineas.

A model of the machine, made on a scal of not less than one inch to a foot, with *certificate* that a machine at large on th same construction, has been advantageousl used, to be produced to the Society on o before the second Tuesday in Feb. 1816.

149. IMPROVED WALKING-WHEEL, O CRANE. To the person who shall invent a improved walking-wheel or crane, on whic the weight or power of any person or per sons shall be applied with the greatest safet and effect, and so contrived that the powe can be varied according to the greater o less weight to be raised or lowered; th gold medal, or thirty guineas.

The model on a scale of not less than on inch to a foot, with a proper *certificate* tha the machine at large has been employed t good effect, to be produced to the Societ on or before the second Tuesday in Fe bruary, 1816.

150. MACHINE FOR RAISING WATER To the person who shall invent a machine o a better, cheaper, and more simple con struction than any hitherto known or in us for raising water out of wells, &c. from depth of not less than fifty feet; the gol medal, or thirty guineas.

Certificates of the performance of the ma chine and a model of it, on a scale of no less than one inch to a foot, to be produce to the Society on or before the first Tuesda in February, 1816.

151. WATER PIPES. To the person who shal invent and discover to the Society a sub stitute for the elm pipes now in common us for the conveyance of water, which shall b cheaper, equally effectual, and more dura ble than any heretofore employed; the gol medal, or fifty guineas.

It is required that one of the pipes s employed, an accurate *account* of the metho used, and every expense attending it, toge ther with satisfactory accounts of its being effectual, to be delivered to the Society o or before the second Tuesday in January 1816.

152. LAYING WOODEN PIPES. To the person who shall invent and discover to the Society a superior method of laying or connecting the wooden pipes now in use for conveying water, so as to lessen the injury they receive thereby; the silver medal, or *twenty* guineas.

It is required that a model, an accurate *account* of the method used, and every expense attending it, together with satisfactory *certificates* of its being effectual, be delivered to the Society, on or before the second Tuesday in January, 1816.

153. EXTINGUISHING FIRES. To the person who shall produce to the Society the best and most effectual method of procuring an immediate supply of water in case of fire, or for the means best calculated to prevent or extinguish accidental fires in buildings, superior to any now in use; the gold medal, or thirty guineas.

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the second Tuesday in January, 1816.

154. BORING AND BLASTING ROCKS. To the person who shall discover to the Society a more simple, safe, cheap, and expeditious method than any hitherto known or in use, of boring or blasting rocks in mines, shafts, wells, &c.; the gold medal, or thirty guineas.

Certificates of the methods having been practised with success, with a full description thereof, to be delivered to the Society on or before the first Tuesday in January, 1816.

155. HEATING ROOMS FOR THE PURPOSE OF MANUFACTURERS. To the person who shall invent and discover to the Society a method of heating rooms, superior to any hitherto known or in use, and at a moderate expense, for the purpose of painters, japanners, and other manufacturers, so as to avoid the necessity of iron or copper tunnels going through the rooms to convey the smoke, whereby the danger from such tunnels may be prevented; the gold medal, or forty guineas.

A model or complete drawing and description of the method, with *certificates* that it has been successfully practised, to be delivered to the Society on or before the last Tuesday in March, 1816.

156. IMPROVED VENTILATION. To the person who shall invent and produce to the Society a mode of permanently ventilating the apartments in hospitals, workhouses, and other crowded places, superior to any now known or used; the gold medal or fifty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, with proper *certificates*, to be delivered to the Society on or before the last Tuesday in February, 1816.

157. PREVENTING ACCIDENTS FROM HORSES FALLING WITH TWO-WHEELED CARRIAGES. To the person who shall invent and produce to the Society a method, superior to any hitherto known or in use, to prevent accidents from the falling of horses with two-wheeled carriages, especially on steep declivities; the silver medal, or fifteen guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, with proper *certificates* that the same has been used with success, to be delivered to the Society on or before the second Tuesday in January, 1816.

158. IMPROVING TURNPIKE AND OTHER ROADS. To the person who shall discover to the Society the most effectual and cheapest method, verified by actual experiments, of combining the materials ordinarily employed in making or repairing roads, so as to form them of the hardest consistency by their cementing properties, or by an artificial mixture of earth, stones, &c. altered by heat, or any other mode, so as to form an even, hard, and durable carriage-road; the gold medal, or thirty guineas.

It is required that an accurate *account* of the method used, and every expense attending it, together with satisfactory *certificates* of its being effectual, be delivered to the Society on or before the first Tuesday in March, 1816.

159. RAISING THE BODIES OF PERSONS WHO HAVE SUNK UNDER WATER. To the person who shall invent and produce to the Society a cheap and portable drag, or other machine, superior to those now in use, for the purpose of taking up, in the best and most expeditious manner, and with the least injury, the bodies of persons who have sunk under water; the gold medal, or thirty guineas.

The drag or machine, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in March, 1816.

160. FOR PREVENTING PREJUDICIAL EFFECTS TO THE PERSONS EMPLOYED IN POINTING NEEDLES. To the person who shall invent and produce to the Society a mode of obviating the prejudicial effects that attend the operation of pointing needles, by grinding them dry, during which the particles of grindstone-dust, and steel, being thrown into the air, and received with it into the lungs, occasion asthma, consumption, and other painful disorders; the gold medal, or thirty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, together with proper *certificates* of its practicability and adoption, to be delivered to the Society on or before the second Tuesday in March, 1816.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE COMMERCE OF THE UNITED EMPIRE.

161. TAKING PORPOISES. To the people in any boat or vessel, who, in the year 1814,

shall take the greatest number of porpoises on the coast of Great Britain or Ireland, by gun-harpoon, or any other method, not fewer than thirty, for the purpose of extracting oil from them; the gold medal, or thirty guineas.

Certificates of the number, signed by the persons to whom they have been sold or delivered for the purpose of extracting the oil, to be produced to the Society on or before the last Tuesday in January, 1816.

162. OIL FROM PORPOISES. To the person who shall manufacture the greatest quantity of oil from porpoises taken on the coast of Great Britain or Ireland, in the year 1815, not less than twenty tons; the gold medal, or thirty guineas.

Certificates of the oil having been made from porpoises actually caught on the coast of Great Britain or Ireland, and two gallons of the oil as a sample, to be produced to the Society on or before the last Tuesday in February, 1816.

163. CURING HERRINGS. To the person or persons who shall, before January, 1816, cure the greatest quantity of white herrings, not less than thirty barrels, equal in all respects to the best Dutch herrings, the same being caught in the British or Irish seas, and cured in a British or Irish vessel or port; the gold medal, or fifty guineas.

164. For the next greatest quantity, not less than fifteen barrels; the silver medal or twenty guineas.

A sixteen gallon barrel of the herrings to be produced to the Society on or before the first Tuesday in February, 1815, with *certificates*, that the conditions of the premium have been fulfilled, and that the whole were cured in the same manner as the specimen, together with a full description of the process employed.

165. CURING MACKAREL. To the person or persons who shall before January, 1816, cure the greatest quantity of mackarel not less in number than ten thousand, in the best manner and to the satisfaction of the Society, the same being caught in the British or Irish seas, and cured in a British or Irish vessel or port; the gold Isis medal, or twenty five guineas.

165.* For the next greatest quantity, not less than five thousand; the silver medal or fifteen guineas.

A sixteen gallon barrel of the mackarel to be produced to the Society on or before the first Tuesday in January, 1816, with *certificates* that the conditions of the premiums have been fulfilled, and that the whole were cured in the same manner as the specimens, together with a full description of the process employed.

The same premiums to be extended one year further on similar conditions.

N. B. Specimens of cured mackarel which promise to afford a most valuable article of trade and food even superior to herrings, have been sent to the Society, and induced them to turn the attention of the public thereto, by offering the above premiums.

PREMIUMS OFFERED FOR TI ADVANTAGE OF THE BRITI COLONIES.

166. NUTMEGS. For the greatest qu tity of merchantable nutmegs, not less tl ten pounds weight, being the growth of Majesty's dominions in the West Indies, any of the British settlements on the cc of Africa, or the several islands adjac thereto, and equal to those imported fr the islands of the East Indies; the g medal, or fifty guineas.

Satisfactory *certificates*, from the gov nor or commander in chief, of the place growth, with an *account* of the numbe trees, their age, nearly the quantity of fi on each tree, and the manner of culture, tc produced on or before the first Tues in January, 1816.

167. KALI FOR BARILLA. To the per who shall have cultivated, in the Bahan islands, or any other part of his Majes dominions in the West Indies, or any of British settlements on the coast of Africa, the several islands adjacent thereto, in year 1814, the greatest quantity of la not less than two acres, with Spanish kali for the purpose of making barilla; the g medal or thirty guineas.

168. For the next greatest quantity, less than one acre; the silver medal, fifteen guineas.

Certificates, signed by the governor commander in chief for the time being, the quantity of land so cultivated, and the state of the plants at the time of signi such *certificates*, to be delivered to the S ciety, with samples of the kali, on or befi the second Tuesday in January, 1816.

169. DESTROYING THE INSECT MONLY CALLED THE BORER. To the pers who shall deliver to the Society an effect method of destroying the insect commor called the borer, which has of late ye been so destructive to the sugar canes the West-India islands, the British setti ments on the coast of Africa, and the veral islands adjacent thereto; the gc medal, or fifty guineas.

The discovery to be ascertained by sat factory *certificates*, under the hand and se of the governor or commander in chief f the time being, and of some other respec able persons, inhabitants of the islands, other place, in which the remedy has be successfully applied; such *certificates* to delivered to the Society on or before tl first Tuesday in January, 1816.

170. CULTIVATION OF HEMP IN UPPI CANADA. To the person who shall so with hemp the greatest quantity of lar in the province of Upper Canada, not le than six arpents, (each four-fifths of statute acre) in the year 1814, and shall the proper season cause to be plucked tl summer hemp, or male hemp bearing s seed, and continue the winter hemp, female hemp bearing seed, on the groui

until the seed is ripe; the gold medal, or one hundred dollars.

171. To the person who shall sow with hemp the next greatest quantity of land in the same province of Upper Canada, not less than five arpents, in the year 1814, in the manner above mentioned; the silver medal, or eighty dollars.

172. For the next greatest quantity of land, in the same province, and in a similar manner, not less than four arpents; sixty dollars.

173. For the next greatest quantity of land in the same province, and in a similar manner, not less than three arpents; forty dollars.

174. For the next greatest quantity of land in the same province, and in a similar manner, not less than one arpent; twenty dollars.

Certificates of the number of arpents, the method of culture, of the plucking of the hemp, with a general *account* whether sown broad-cast or in drills, the expense, soil, cultivation and produce, to be transmitted to the Society, certified under the hand and seal of the governor or lieutenant-governor, together with 28lb. of the hemp, and two quarts of the seed, on or before the last Tuesday in April, 1816.

175 to 179. In Lower Canada. Premiums exactly similar in all respects to those held out for the province of Upper Canada, are also offered to the Province of Lower Canada.

180 to 184. In Nova Scotia and New Brunswick. Similar premiums in all respects are also offered to the provinces of Nova Scotia and New Brunswick.

185. Importation of Hemp from Canada, Nova Scotia, and New Brunswick. To the master of that vessel which shall bring to this country the greatest quantity of marketable hemp, not les than one hundred tons, in the year 1815, the produce of Upper Canada, or of one of the above-mentioned provinces; the gold medal.

186. To the master of that vessel which shall bring the next quantity, not less than fifty tons; the silver medal.

Certificates satisfactory to the Society, to be produced by the master of the vessel on or before the first Tuesday in February, 1816, to testify that such hemp was grown and prepared in Canada, Nova Scotia, or New Brunswick.

187. Substitute for Hemp. To the person who, in the year 1815, shall discover and produce to the Society, a substitute for hemp, equally cheap, durable, and applicable to all the purposes for which hemp is now used; the gold medal or fifty guineas.

A quantity of the substitute, not less than one hundred weight, together with proper *certificates* from the governor or commander in chief, if raised in any of the British colonies, or from the Secretary of the Board of Trade, if raised in the East-Indies, to prove that the same has been used with success to be produced to the Society on or before the last Tuesday in February, 1816.

N.B. The premiums for Nos. 166, *to* 187, *are all extended one year further, on similar conditions. Certificates to be produced at the same time for the year ensuing.*

188. Silk. For the greatest quantity of silk proper for manufactures, not less than one hundred pounds weight produced by any person in Malta, or islands near or adjacent thereto, in the possession of Great Britain, in the year 1815, from silk-worms bred there; the gold medal, or fifty guineas.

Specimens of the silk, not less than one pound, with an *account* of the method in which the silk-worms were managed; the kind and size of the mulberry trees from whence they were furnished with food, and particulars respecting the culture of the mulberry trees for that purpose, to be produced to the Society on or before the first Tuesday in March, 1816.

189. For the next greatest quantity not less than fifty pounds, on similar conditions; the silver medal, or twenty guineas.

Satisfactory *certificates* from the governor or commander in chief of the district where the said silk was produced, and of the several particulars above-mentioned, to be delivered to the Society along with the samples required.

N. B. The same premiums, on similar conditions, will be given for silk produced in the years 1816 and 1817, *certificates* to be sent at the same time of the years ensuing.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH SETTLEMENTS IN THE EAST INDIES.

190. Bhaugulpore Cotton. To the person who shall import into the port of London, in the year 1815, the greatest quantity, not less than one ton of the Bhaugulpore cotton, from which cloths are made in imitation of nankeen, without dyeing; the gold medal.

A quantity of the cotton, not less than five pounds weight, in the pod, and five pounds carded, to be produced to the Society, with proper *certificates*, signed by the Secretary of the Board of Trade of Bengal or Bombay, on or before the last Tuesday in February, 1816.

191. Annatto. To the person who in the year 1815, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of annatto, not less than five hundred weight; the gold medal.

A quantity of the annatto, not less than ten pounds weight, to be produced to the Society, with proper *certificates*, signed by the Secretary of the Board of Trade of the respective settlement, that the annatto is the produce of such settlement, on or before the last Tuesday in February, 1816.

192. True Cochineal. To the person

who, in the year 1814, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of true cochineal, not less than three hundred weight; the gold medal.

A quantity of the cochineal, not less than three pounds weight, with proper *certificates*, signed by the Secretary of the Board of Trade of the respective settlement, that the cochineal is the produce of such settlement, to be produced to the Society on or before the first Tuesday in February, 1816.

N.B. The Premiums from No. 190 to 192 inclusive, are all extended two years further on similar conditions. Certificates to be produced at the same time of the years ensuing.

GENERAL CONDITIONS.

AS the great object of the Society in rewarding individuals is to draw forth and give currency to those inventions and improvements, which are likely to benefit the public at large, candidates are requested to observe, that if the *means*, by which the respective objects are effected, do require an expen-e or trouble too great for *general purposes*, the Society will not consider itself as bound to give the offered *reward*: but, though it thus reserves the power of giving in all cases such part only of any premium as the performance shall be adjudged to deserve, or of withholding the whole if there be no merit, yet the candidates may be assured the Society will always judge liberally of their several claims.

All candidates are to take notice, that no claim for a premium will be attended to, unless the conditions of the advertisement are fully complied with.

All models of machines, which obtain premiums or bounties, shall be the property of the Society; and, where a premium or bounty is given for any machine, a perfect model and description thereof shall be given to the Society.

All the premiums of this Society are designed for Great Britain and Ireland, unless expressly mentioned to the contrary.

The claims shall be determined as soon as possible after the delivery of the specimens.

It is expected that all articles for claims or bounties be sent to the Society, carriage paid.

No person shall receive any premium, bounty, or encouragemnt, from the Society, for any matter for which he has obtained, or purposes to obtain, a patent, or for which he has obtained, or expects any premium or reward from any other Society.

A candidate for a premium, or a person applying for a bounty, being detected in any disingenuous method to impose on the Society, shall forfeit such bounty, and be deemed incapable of obtaining any for the future.

No member of this Society shall be a candidate for, or entitled to receive, any premium, bounty, or reward whatsoever, except the honorary medal of the Society. The candidates are, in all cases, expected to furnish a particular account of the subject of their claims; and where certificates are required to be produced in claim of premiums, they should be expressed, as nearly as possible, in the words of the respective advertisement and be signed by disinterested persons whohave a positive knowledge of the facts stated.

Where premiums or bounties are obtained in consequence of specimens producesd, the Society mean to retain such part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No candidate, not a member, shall be present at any meeting of the Society or Committees, or admitted at the Society's rooms, after they have delivered in their claims, until such claims are adjudged, unless summoned by the Committee.

The Society, anxious to promote the Arts of their country, have adopted the resolution of forming a Collection of Prints, to be open for public inspection; and, having arranged those already in their possession, invite engravers to send etched or finished proofs of their plates; and hope that amateurs, collectors, and publishers of works of art, will also contribute to the undertaking.

Prints of machines, or maps, will also come within the above arrangement.

The Society further invite the communications of scientific and practical men, upon all subjects connected with the views of the Society, although their experiments may have been conducted upon a smaller scale than the terms required by the premiums; as such communications may afford ground for more extensive application, and thus materially contribute to the advantage of the public.

The Library of the Society, which has already become very valuable, may yet receive considerable additions and improvements from the presents of members, or other persons who may be inclined to place useful books or valuable manuscripts in a repository, at once permanent and conducive to the national benefit.

All communications are to be made by letter, addressed to CHARLES TAYLOR, M. D. the Secretary, *at the Society of Arts, &c. Adelphi, London.*

And where articles are sent by Sea for the Society, the Bills of Lading are to be addressed to the care of WILLIAM VAUGHAN, Esq. *Mincing-lane, London,* who has politely undertaken to receive them for the Society.

The Winchester bushel is the measure referred to for grain; and, as the acres of different districts vary in extent, it is necessary to observe, that the Society mean Statute Acres of five and a half yards to the rod or pole, when acres are mentioned in their list of premiums; and they request that all communications to them may be made agreeably thereto.

The Society desire that the Papers on different subjects sent to them may be full, clear, and explicit, fit for publication, and rather in the form of Essays than of Letters: and that descriptive Drawings may be sent, with the Models and Machines laid before the Society.

*** To persons inclined to leave a sum of money to this Society by will, the following form is offered for that purpose.

Item. I give and bequeath to A. B. and C. D. the sum of upon condition and to the intent that they, or one of them, do pay the same to the Collector, for the time being, of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures, and Commerce; which said sum of I will and desire may be paid out of my personal estate, and applied towards the carrying on the laudable designs of the Society.

N. B. The Society considering that it would be beneficial to the Commerce of the United Kingdom to bring the British Marbles into more general use, and that the most effectual method of accomplishing their object would be, for the present, *to make them more generally known in the Capital, have come to the following resolutions:—*

Resolved.—That specimens of British Marbles be exposed in the Society's Rooms, in the Adelphi, for the inspection of the public, under the following regulations:

1st. That all the specimens be exact to a given size, *viz.* eight inches high, six inches broad, one inch thick, and polished on one face.

2. That a book be kept, containing the number of each specimen, and describing the situation of the quarry, the name of the parish where situated, the distance of the quarry from a beaten road, and the distance of that road from water-carriage, with the name of the donor and proprietor. Any remarks on the qualities of the marbles, or on the lime produced from them, will be gratefully received and preserved by the Society, as materials for future inquiries.

Resolved,—That as the exertions of the Society can be generally beneficial, only inasmuch as their views are seconded by the public, the Society request, that all persons proprietors of marble quarries, will favour them with a specimen of the marble, worked to the exact size above mentioned, with the description of the quarry as above, that the same may be entered in the book to be preserved for the use of the public. By such arrangements, it is expected that the interest of the proprietors of the quarries will be promoted, and the use of British marble much extended. A variety are already exhibited in the Society's Room.

The Society take this opportunity of returning their thanks to the several Societies and individuals, who have favoured them with presents for their Repository and Library.

Premiums and Rewards bestowed by the Society of Arts, Manufactures, and Commerce, Adelphi, during their Session, which commenced on the fourth Wednesday in October, 1814, *and closed on the* 14*th of June,* 1815.

ON Tuesday the 30th of May, 1815, his Grace the DUKE of NORFOLK, the President, distributed the Rewards then adjudged.

IN AGRICULTURE.

To Henry Coape, Esq. of Gloucester Place, Portman Square, for gaining 110 acres of land from the sea, Class 42, the gold medal.

To B. Thornhill, Esq. of Stanton, near Bakewell, for extensive plantations of forest trees, Class 14, the gold medal.

To J. C. Curwen, Esq. V. P. of Workington Hall, Cumberland, for improving upwards of 400 acres of waste land, Class 44, the gold medal.

To Henry James Nicholls, Esq. Woodhall, near Wisbeach, for a useful method of preventing vicious Bulls from doing mischief, the silver medal.

To H.B. Way, Esq. of Bridport Harbour, for preserving carrots fit for food during the winter months, the silver Ceres medal.

To Mr. James Ogden, at T. D. Astley's, Esq. Duckinfield Lodge, Ashton-under-Line for improved sheers or pruning instruments, ten guineas.

IN CHEMISTRY.

To Thomas Hoblyn, Esq. F.R.S. Sloane Street, for introducing the importation of cocoa nut oil in large quantities from the island of Ceylon, the silver medal.

To Mr. John Baker, Great Wild Street, for purifying whale oil, five guineas.

To Mr. William Smith, of Buckingham Street, for a coloured fifteen sheet mineralogical map of England and Wales, on a scale of five miles to an inch, fifty guineas.

IN POLITE ARTS.

To Mr. George Phillipps, of Wandsworth Road, for an original painting of the interior of a gothic hall, the gold medal.

To W. H. Harriot, Esq. of West Hall, Mortlake, for an original painting of a landscape, the silver medal.

To Mr. Edward Scriven, Clarendon Square, Somer's Town, for five engravings from Mr. West's picture of Christ rejected, the gold Isis medal.

To Miss Augusta J. E. I. Baker, of Dowdeswell, near Cheltenham, for an original drawing of flowers, Class 103, the gold medal.

To Miss Elizabeth Watson, of Wisbeach, Cambridgeshire, for a drawing of Belisarius, a copy, the silver Isis medal.

To Mr. James Robertson, Great Chesterfield Street, Mary-le-bone, for a drawing, an original view of Matlock Bath, the silver medal.

To Mr. James Duffield Harding, Church Row, Greenwich, for a drawing, an original view at Hastings, the silver Isis medal.

To Mr. William Enom, Swinton Street, Gray's Inn Lane Road, for a pen and ink drawing of a Head, the silver medal.

To Miss Louisa Anne Phillips, Wandsworth Road, for an original Drawing of new Shoreham church, the silver Isis medal.

To Miss Cotton, of Chichely, Newport Pagnel, Bucks, for an original drawing of fruit the silver palette.

To Miss Sophia Lagden of Ware, Herts, for a landscape view at Hamwell, the silver palette.

To Mr. William Long of Horton Street, Kensington, for an original sketch of a lady and child, the silver medal.

To Mr. Jabez Newel, White Cross Street, Cripplegate, for a drawing of the Discobolus, the silver medal.

To Mr. William James Ward, Buckingham Street, Fitzroy Square, for a drawing of St. John's head in a charger, the silver Isis medal.

To Miss Emma Eleonora Kendrick, Upper Mary-le-bone Street, Fitzroy Square, for an original miniature of Cleopatra, dissolving the pearl, the gold Isis medal.

To Mademoiselle Guersouille, at the Earl of Coventry's Piccadilly, for a drawing after an oil painting by G. Metzu, the silver medal, set in gold.

To Mr. J. Bonomi, Charlotte Street, for an original bass relief in plaster, the silver medal.

To Mr. H. Rossi, Lisson Grove, North Mary-le-bone, for a copy of a plaster cast, the silver medal.

To Mr. Thomas Christmas, Upper Kennington Place, for a drawing from a plaster cast, the silver palette.

To Miss Emma Tomkins New Bond St. for a drawing of the Head of Jupiter, the silver palette.

To Miss Taylor, Tothill Street, Westminster, for a drawing of the Silence, the silver palette.

To Mr. John Goldicut, Clarges Street, for an original architectural design of a Mausoleum, the silver medallion, Class 115, *in conformity to the Will of the late John Stock, Esq. of Hampstead.*

To Mr. Thomas Leverton Donaldson, Bloomsbury Square, for an original architectural design, the silver Isis medal.

To Mr. Alfred B. Clayton, Wilson Street, Finsbury Sqnare, for an original architectural design, the silver Isis medal.

To Mr. Frederick Harding, Compton Street, Brunkwick Square, for a drawing of a Portrait the silver palette.

To Mr. C. W. Day, Compton Street, for a drawing from Le Brun, the silver palette.

To Master Edward Landseer, Foley Street, for an original painting of a Dog, the silver Isis medal.

To Master Charles Landseer, Foley Street, for a drawing of the Laocoon, the silver palette.

To Master Hugh Ross, Macclesfield Street, Soho, for an original miniature, the silver palette.

To William Franklin, Epping, a Journeyman Shoemaker, and self-taught Artist, for a neat and original pen and ink drawing of Theydon Place, near Epping, the silver palette.

IN MANUFACTURES.

To Mr. Thomas Scorrar, Green Street, Bennet's Row, Blackfriar's Road, for smoothing or blocking straw hats, ten guineas.

To Mr Edwin Jones, Southampton, for his plan of serving or laying ships' ropes by one person only, ten guineas.

IN MECHANICS

To the Chevalier Paul Assalini, Munich, for improvements in surgical instruments and operations, the gold medal.

To John Hyslop, Esq. Fenchurch Street, for an improved lancet for opening Abscesses, the silver medal.

To Mr. J. Buck, Fort Place, Bermondsey, for an apparatus to examine the state of ships' bottoms whilst at sea, the silver medal and ten guineas.

To Mr. Alexander Law, R. N. Deal, for his improved plan of conveying intelligence to sea and land, twenty guineas.

To Mr. Alexander Law, R. N. Deal, for his method of securing ships' guns and carriages; the silver medal.

To Mr. John Rapson, Penryn, Cornwall, for an improved stop or drag, for carriages going down hill, the silver medal.

To Mr. Richard Williams, H.M. Dock Yard, Chatham, for removing the centres of brick or stone arches without risque to the workmen, the silver medal.

To Bracey, Clark, Esq. Giltspur Street, for hobbles for making horses lie down, and preventing danger to the assistants and pain to the animal in surgical operations, the silver medal.

To Mr. Wm. Franklin, Stacey Street, New Compton Street, for a lifting and forcing pump to raise water, the silver medal, and fifteen guineas.

To Mr. William Bowler, Church Lane, Strand, for an apparatus to dry pulse or grain in bad seasons five guineas.

To Mr. John Barrow, York Court, East Street, Manchester Square, for a double door spring, the silver medal and ten guineas.

To Mr. John Barrow, York Court, East Street, for a single door spring the silver Isis medal.

To Mr. James Braby, Pedlar's Acre, for a useful family weighing machine, the silver medal.

To Mr. Peter Nicholson, Oxford Street, for a new centro-lined for drawing lines to a vanishing point; the silver medal.

To Mr. Hamilton Fulton, Newman Street, Oxford Street, for an improved protractor, the silver medal.

To Mr. G. O. Needham, Bishop's Row, Nottingham, for improved carding and spinning machinery, the gold medal, and forty guineas.

To Mr. G. O. Needham, of Nottingham, for an improved roving machine, twenty guineas.

IN COLONIES AND TRADE.

To Phillips London, Esq. Cannon Street, for curing mackarel for exportation, the silver medal, set in gold,

To Mr. Charles Whitlow, of Canada, for the preservation of potatoes for sea stores, the silver medal.

To Captain Joseph Cotton, of the Trinity House, for his great exertions in the culture and importation of Calooee hemp from the East Indies, the silver medal.

The Anniversary Dinner of the Society took place on the same day at the Freemasons' Tavern, His Grace the DUKE *of* NORFOLK *in the Chair.*

*** *The Public are requested to guard against imposition, from persons advertising or pretending to have patents, for articles rewarded by the Society. It is a stipulated condition, that all persons who receive premiums, or bounties, from the Society, shall relinquish all pretensions to a patent for articles so rewarded, and shall allow them to be made by any person whatever.*

The Public are also cautioned against purchasing articles sold under a pretended sanction of the Society's name. Information may be had, by enquiry at the Society's House, whether the advertised articles are, or are not, deceptions upon the Public.

*** Since the last Distribution of Rewards, ONE HUNDRED AND NINE new Members have been elected.

THE LIST of PREMIUMS offered, may be had, *gratis*, at the Society's House in the Adelphi. By Order of the Society,

June, 1815. CHARLES TAYLOR, M.D. Secretary.

N. B. Where errors have arisen in the address of any Member of the Society, information is desired to be given to Mr. R. Elwin, the Collector, at the Society's House in the Adelphi, who receives the Subscriptions from the Members, and furnishes Receipts for the same.

Lately was published Price 10*s.* 6*d.*

THE THIRTY-SECOND VOLUME of the SOCIETY'S TRANSACTIONS, which may be had from the Housekeeper, at the Society's House in the Adelphi. Also complete Sets of their Transactions, or any single Volume.

Also, An ANALYTICAL INDEX of the FIRST TWENTY-FIVE VOLUMES of the TRANSACTIONS of the SOCIETY, to the Termination of their Session, June 1807, price 5*s.* With a list of the machines and models in the Society's Repository to the year 1813, inclusive.

A CATALOGUE of the BOOKS in the Society's Library may be procured as above price One Shilling, along with an Appendix thereto.

PAPERS

IN

AGRICULTURE.

The GOLD MEDAL *of the Society, the Premium offered in Class 44, was this Session adjudged to* J. C. CURWEN, *Esq.* V.P. *of Workington Hall, Cumberland, for Improving upwards of 400 Acres of Waste Land. The following Communications were received from him, and a Plan of the Land is preserved in the Society's Repository.*

DEAR SIR,

I REQUEST, through your hands, to submit my claim for the Society's Premium, for the Improvement of Waste Lands.

In the course of the Year 1813, three hundred acres of Waste Land were inclosed, planted with thorns, and fenced with railing cut from some of those Plantations,

for which I had the honour to receive the Society's Medal. The whole was pared and burnt; two hundred and eighty acres were sown with Wheat, twenty with Oats, at a cost of six pounds eighteen shillings and eight pence per acre; viz. paring one guinea, burning ten shillings, scaling five shillings, eighty Winchester bushels of lime one pound six shillings and eight pence; plowing, harrowing, &c. one pound six shillings; three-and-a-half Winchester bushels of seed two pounds ten shillings.

The Crop was most promising, but suffered from the unfavourable Summer, as I fear a great proportion of the wheats have done. I do not therefore calculate on more than twenty Winchester bushels per acre of marketable Grain.

Though I may be allowed to feel some pride in the accomplishment of so extensive an undertaking, I do not make my claim on that ground for the favour of the Society, but flatter myself the plan I have adopted for bringing such lands into a regular course of crops, holds out great advantages for the farmer as well as the public.

The first inclosed lands in this country thirty-five years ago, bore for some time most luxuriant crops, but, by a continuation of white crops, the ground was so deteriorated that it has never recovered. There is too much reason to apprehend a recurrence of the same thing on the extensive tracts of waste now under cultivation; covered as they are with most luxuriant crops, much of the pleasure the sight is calculated to produce, is lost in contemplating that a few years will, in a great measure, destroy their fertility.

There are, within the last ten years, above two hundred thousand acres of new inclosure. Within this period Cumberland imported a hundred and fifty thousand pounds worth of grain. It now exports nearly three hundred thousand

thousand pounds worth, with increase of population of one ninth. If I should be so fortunate as to obtain the honor I solicit, it may draw the attention of the country to what I have done, and prevent a serious public, as well as private injury. Great Britain can never be well supplied with grain, till we are an exporting country. The variations of seasons will be equal to a fourth; to provide for this, the surplus produce in average years should be equal to it. Grain would not, under such circumstances, be subject to the fluctuations of price which have occurred so frequently of late years.

The distance of my new inclosed lands from my other farm buildings prevents the bringing of manure with any prospect of return. I had forty acres at the distance of three miles from the Schoose farm; it was cropped with wheat. I had no possible means of taking green crops with any view of its re-paying me; this decided my fallowing it, and burning such sods and roots as I could collect; a few ashes were furnished by this means; to these I added a second dose of lime, equal to the first, and sowed it with wheat, in this I committed an error; oats would have paid me better. The second crop was moderate; the clover most abundant, yielding fully two tons and a half of hay, and it is covered at this moment with a most luxuriant plant of clover. The appearance of this crop has procured me a most desirable tenant for Lilly Hill upwards of four hundred acres.

	£.	s.	d.
Cost of the first Crop -	8	18	8
Fallow - - - -	8	0	0
Four years' Rent and Taxes	8	0	0
Clover, Seed, &c. -	2	0	0
	26	18	8

First Crop of Wheat sold for	16	0	0
Second Ditto	10	0	0
Clover	10	0	0
	36	0	0

The profit above two pounds fifteen shillings and sixpence per acre, the ground originally worth two shillings and sixpence per acre, now forty shillings. If I had made my Irish tour previous to my laying this land down, I could have done it better. I there saw, with great delight, the prodigious crops obtained by burning the soil. I lost not a moment on my return to carry this mode into effect. I have burnt some thousands of cart loads. Sixty acres are prepared for wheat, with fifty cart loads of these ashes, and sixty Winchester bushels of lime. I have guaranteed this crop to produce twenty-seven Winchesters per acre. I conceive the ashes may be burnt for 8*d.* a cart load, and on the very spot where they are wanted.

I have this year broke up a hundred acres of new inclosure, and left patches of ground here and there, for burning for the next crop. By this plan, in three years I got two white crops, and have my land laid down in high condition without the assistance of dung.

This is not all the benefit, for I have the command of the manure produced from the new inclosure, to confirm the condition of the land within distance of my farm buildings. It naturally opens a new speculation, if ten tons of manure produce thirty tons of turnips, what will twenty do? Clay soils can scarcely be overdosed with manure; I shall try to what extent it may be carried. I have finished my harvest, having cut twenty thousand shocks; fourteen thousand of wheat, the whole is stacked.

I am

I am very sanguine in my expectation of gratifying the Society with a view of the advantages of soiling in rearing cattle. I have seventeen calves bringing up, which will give a fair opportunity of judging of the experiment. In my way to Dumfries lately, I met with Mr. Church, one of the most distinguished farmers in this quarter; he assured me that he never had finer turnips than he has this year from ashes alone, and that all his neighbours are following his example.

I remain faithfully, Dear Sir,

Your obliged Friend,

J. C. CURWEN.

Workington Hall, Sep. 17, 1814.

To C. TAYLOR, M.D. SEC.

CERTIFICATES.

WE do hereby certify, that the plan now sent, is a true statement of the Common or Waste Land of John Christian Curwen, Esq. of Workington Hall, Cumberland, broken up, inclosed and cultivated by him in the township of Workington, in the parish of Workington, under an Act passed in the forty-ninth year of his present Majesty: and that the parts coloured green in the plan, amounting to 163 acres, 2 roods, and 26 perches, were cropped in 1814 in hay and grass; and the parts coloured yellow, amounting to 255 acres, were cropped in the same year in wheat; and that the whole amounting to 418 acres,

2 roods, and 26 perches, is well fenced, and in most excellent condition.

Witness our Hands, this 24th of January, 1815,

JOHN LITT, a Commissioner under the said Act.

BEN. THOMPSON, Clerk to the Commissioners.

WM. HOODLESS, Surveyor.

*** BY order of the Committee of Agriculture, several questions were proposed to Mr. Curwen for elucidation, upon which the following letter was received in answer.

MY DEAR SIR,

I HASTEN to acknowledge and thank you for your obliging letter, and I have great pleasure in furnishing the Society with the information they require respecting the burning of soil.

The most approved mode in Ireland, and that which is attended with the least labour, is to leave a circular space of land, from ten to twenty feet in circumference for placing the fire. Alternate circles of a foot broad, eight inches in length, and as much in depth, are cut out and laid to dry on an equal space. The quantity cut and left is regulated by the size of the place appropriated for the fire, it rarely exceeds twenty yards, by which means one person can manage the fire. When the sods are sufficiently dry for burning, a kiln is formed of fresh cut sods, and the walls hard beaten to prevent the air from penetrating. An air-hole is left opposite to the side. When

the

the fire is placed, as the ashes increase the walls of the kiln are carried up. The fire is lighted with turf or wood, and the dry sods. When a proper degree of fire is raised, the dry and wet sods cut from those left are mixed, so as to moderate the strength of the fire. In the regulation of the fire, the whole mystery consists; if it is too strong, it calcines the mixture.

I burnt my ashes last year in square holes of great size, containing seven or eight hundred single horse cart loads each; this causes a much greater labour, both in wheeling the sods and erecting scaffolding to get the sods on the kiln. The danger of calcining is greater when there is so large a body of fire.

I am inclined to believe that when the sods have a good deal of roots of grass and are quite dry, they may be burnt without a kiln, but I have not as yet had sufficient experience to recommend it; if it can be done, it will save a great deal of labour. I calculate on burning the ashes at eight pence a cart load.

I understand that Mr. Wallace, a farmer near Kilcuthbright had admirable turnips with thirty single carts of ashes. I have my doubts as to the weight of a single cart: I conjecture sixty stone; Mr. Wallace thought eighty. Mr. Church, of Kitchell, near Annan, had very weighty turnips last year from ashes. Mr. Wallace thought, spreading the ashes before gathering into stitches, answered as well as depositing the ashes in the drill. If so, much trouble is saved. I should not recommend less than forty carts. Mr. Wallace's ashes were made entirely from clay, and would consequently be stronger than from a mixture of soil.

To burn clay alone will require the assistance of wood. I have cut a great extent of sods; the unceasing wet of

last month has prevented my being able to do any thing in burning. I purpose to have fifty acres of turnips from ashes this year. There are numbers in this county and neighbourhood who propose burning. I expect it will do much in extending the growth of turnips. A further and most material advantage will arise, it will enable the Farmer to give an increased quantity of manure to potatoes. My potatoes have this year 33 tons, Swedes 30. I used to suppose two thousand stones of potatoes an abundant crop. I confidently expect 2600 from this manuring; admitting the produce of the whole course to be proportionably augmented, the increase of cost will be amply repaid. I consider this as a most interesting experiment for clay and strong soils. I shall shortly send to the Society a copy of the Report of the Workington Agricultural Society, when you will see a most valuable Communication respecting an Experiment of Mr. Stewart, of Fife.

I am now feeding my stock with Swedish turnips pulled in October; there is scarce a decayed turnip to be found amongst them. I sent some last week to Edinburgh to convince the farmers there of the advantage of pulling and stacking turnips.

I hope shortly to send you a paper on rearing stock on the soiling system; it bids fair to exceed my utmost expectation, sanguine as I admit myself to be. I think I shall bring my two years old to a hundred stone live weight, (fourteen pounds to the stone.) Killing above 50 stone, and this on the produce of two acres, straw not included.

If so, this will be the greatest product of victuals that has ever been obtained. If animal food could be made so cheap as to be in general use, it would greatly lessen the

the consumption of bread. I think it is possible. I have numerous visitors, who express their astonishment at the size and condition of the stock.

I am,

Dear Sir,

Your obliged humble servant,

J. C. CURWEN.

Workington Hall, April 2, 1815.

To C. TAYLOR, M. D. SEC.

The GOLD MEDAL, *the Premium offered in Class 14, was this Session adjudged to* BACKE THORNHILL, *Esq. of Stanton, near Bakewell, in Derbyshire. The following Communication was received from him respecting his extensive Plantations of Forest Trees.*

SIR,

I BEG leave to trouble you with the enclosed account of the plantation made by me in the Winter of 1811-12, for which I hope to obtain the Gold Medal offered by the Society in Class 14 this year.

I have endeavoured to state all such particulars as I conceive may be interesting, and I have got Certificates to the statement from persons who are all in public situations

situations in business and entirely unconcerned with and independent of the undertaking.

I am, Sir,

Your most obedient humble Servant,

BACKE THORNHILL.

Stanton, Bakewell, Derbyshire;
Dec. 1, 1814.

To C. TAYLOR, M. D. SEC.

STATEMENT.

Mr. Backe Thornhill, of Stanton in the Peak, in the county of Derby, upon the inclosure of the adjacent common, designed to plant such part of his allotment as should be unfit for Agricultural purposes.

Agreeably to this plan, he inclosed and planted one hundred and sixteen acres of this land, between the 1st of October, 1811, and the 1st of April, 1812. On the most elevated part, where the soil is a bad grit-stone, producing nothing but the shortest heath, he planted two years old transplanted Larches and Scotch Firs only; on the elevated adjoining spots where the Heath grows longer, indicating a better soil, he mixed Spanish Chesnuts, Wych Elms, Beech, and Ash, of a larger size with the Firs, which were also a year older; and on the lower situations where a strong Fern appears instead of the Heath, he planted Oaks, Spanish Chesnuts, and Wych Elms, with Larch, Scotch, and Spruce Firs, as nurses for the deciduous trees, the best of which (chiefly Oaks and Chesnuts) it is intended to leave for timber.

The

The making of the holes was let after the hay harvest in 1811, to the poor people in the neighbourhood.

Those on the high land for the smaller plants were sixteen inches square, and three and a half feet asunder, making 3556 per acre, those on the lower land for the larger plants were twenty inches square and deeper in proportion, and at four feet distant from each other, making 2722 holes per acre. For each kind of land holed in this manner, the soil being well broken with the hack, and the work in all respects approved by Mr. Thornhill's Bailiff, thirty shillings per acre were allowed, and in such cases as the Bailiff found the work ill done, he, according to the prior agreement, made such deductions from the payments as he thought sufficient to pay other people for compleating it.

When the earth of the holes by exposure to the weather had become friable, the plants were placed therein by the neighbouring poor, who have been in the habit of doing this sort of work at daily wages under the directions of Mr. Thornhill's nursery men.

The success of this plan has been evinced by the few losses of plants which have occurred and by the flourishing state in which they appear, considering the peculiarly bad soil in which they grow.

To this plantation (for which the Gold Medal is claimed) others have since been added, making on these otherwise unproductive parts of the late common of Stanton, upwards of two hundred and seventy acres of thriving wood land, well inclosed and intersected with carriage roads, and which are calculated to afford, beside the usual advantage of ornament and profit, a valuable shelter to the adjacent lands, which are in peculiar want of such protection.

CERTIFICATES.

CERTIFICATES.

WE do hereby certify, that the plantations referred to in the above statement are well fenced and secured, and the plants appear generally to be healthy, and in a growing state.

JOHN NUTTALL, Land Surveyor, Matlock.

WM. BRITTLECOMB, Attorney, Winstey, Derbyshire.

P. GELL, M. P.

WM. PONTEY, Author of the Profitable Planter, &c.

The GOLD MEDAL *of the Society, the Premium offered in Class 42, was this Session adjudged to* HENRY COAPE, *Esq. of Gloucester Place, Portman Square, for gaining* 110 *Acres of Land from the Sea. The following Communications were received from him, and a Plan of the Land is preserved in the Society's Repository.*

SIR,

ABOUT two years ago I purchased from Mr. Richard Croft, of Burlington Street, London, the Farm, called Bridge Marsh, which comprized the whole of an island, or Bank of Saltings, situated in the Crouch river, in the parish

parish of Lutchingdon, in the county of Essex; the whole of which was overflowed seventy years ago at spring tides, and of which about 200 acres were inclosed from the tide, and were under culture at the time of my purchase, and have been so ever since. The island is of an oval or oblong form; and observing that at each extremity there still remained some quantity of Salt Marsh uninclosed and quite useless, I resolved to make an effort to render this marsh productive.

A very rapid current and strong tide prepared me for great expence and labour, and the work has not been completed without a large portion of each. The soil is an excellent strong clay earth with loam, and I hope it will, in a very few years, become good pasture and arable land.

The wall is composed of the soil itself, dug from a ditch which runs along the inside of the wall, and additional soil taken from the fore and back ground.

As new walls always sink or settle, it must occasionally be new topped with the same materials, so as to keep it two feet above the highest tide. It will become more solid and compact by the growth of a wiry coarse grass, which comes naturally but gradually: it is not usual to sow any other grass upon sea walls in Essex.

The embankment of both ends is about 4760 yards in extent; the average height above the surface of the land is five feet perpendicular; the average width at the base is about twenty-eight feet, the width at the top about five feet; the fore land towards the sea is twenty feet, the back fore land fifteen feet wide. The rain which falls on the land is let out at low water through two sluices, or gutters, one foot square, one gutter in each piece. The quantity inclosed is about 110 acres. I send herewith a sketch

sketch of the map, and am willing to exhibit the map itself, if desired.

I have the honor to be,

Sir,

Your most obedient Servant,

HENRY COAPE.

Gloucester Place, Portman Square,
Nov. 26, 1814.

To C. TAYLOR, M. D. SEC.

CERTIFICATES.

WE whose names are here underwritten; the Churchwarden, Surveyor, Overseers, and Inhabitants in the parish of Lutchingdon, in the county of Essex, hereby certify that two pieces of salt marsh land, one at the East end, the other at the West end, of an island in or near the centre of the river Crouch, which island is known by the name of Bridge Marsh Farm; and which two pieces, now inclosed, contain together 110 acres, or thereabout, have, within the last twelve months been inclosed by Mr. Henry Coape, of Gloucester Place, London, from the river Crouch, and that the land which was overflowed every spring tide, is now preserved from inundations, and from being useless marsh land, is likely to become shortly valuable and productive.

WILLIAM RUSH, Churchwarden.

JACOB DINES, Surveyor of Works.

JOHN GLASCOCK, Overseer.

JAMES BAKER,

&c.

SIR,

THE land inclosed being in the very centre of the rapid river Crouch, and subject to very high tides, was attended with far more expense than the usual cost of such works. I contracted for the job to be completed for £2600 of which sum £2000 was the estimate of the outward walling, and £600 for internal divisions into fields of about ten acres each, by banks, with a deep ditch on each side of the bank, and gates with posts and rails in each division or field. The workmen made use of barrows and hurdles in carrying the mud or ouse. The inland drains are cut deep, each conducting the inland water to the gutters or sluices which let it out into the river at low water.

Since being completed, my tenant informs me that the outward wall has stood some of the highest tides known for many years, and has cost only five pounds in repairs of the damage, but it requires frequent topping in proportion as it sinks, as being formed of mud only, it may not be quite solid till next year.

By fore-lands before mentioned, I mean the distance between the wall and the river on one side, and the wall and the ditch on the other. I shall be happy to give the Society any further information, and obliged by any questions to elucidate such undertakings. I may probably pursue this object further.

I have the honour to be,

Sir,

Your most obedient servant,

HENRY COAPE.

18, *Gloucester Place, March* 29, 1815.

To C. TAYLOR, M.D. SEC.

Ten

TEN GUINEAS *were this Session voted to Mr.* JAMES OGDEN, *at* T. D. ASTLEY'S, *Esq. Duckinfield Lodge, Ashton-under-Line, for improved Garden Shears, or Pruning Instruments. The following Communication was received from him, (an explanatory Engraving is annexed) and the various Instruments are preserved in the Society's Repository.*

SIR,

I HAVE sent to the Society three pair of Shears, or Implements for Pruning, on a new construction. The general principle of them differs in action from that of the common cutting shears, which tend to force from them the object intended to be cut; whereas, the shears now sent are so contrived as to draw nearer to them the article to be cut, without making a false stroke. The effect is produced, with some difference of mechanical construction, in each of the implements sent.

I remain,

Sir,

Your humble servant,

JAMES OGDEN.

Duckinfield, May 18, 1813.

To C. TAYLOR, M. D. SEC.

SIR,

SIR;

I HAVE the pleasure to acquaint you, that hundreds of my shears are now in use in this country, and are every where approved of. There is scarcely any gentleman, farmer, or gardener in this neighbourhood, who does not use them.

I remain,

Sir,

Your obedient servant,

JAMES OGDEN.

Duckinfield, May 23, 1815.

To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Mr. OGDEN's *Pruning Shears. Plate* 1. *Fig.* 1, 2, 3, 4, 5, *and* 6.

FIG. 1, shews a pair of small pruning shears, which possess the property of the chop *d* holding the branch, while the knife chop *b* moves in its groove on the joint pin *c*, the motion of which is directed by the bar *d*, and the traverse motion of the knife chop cuts the branch with the least possible exertion, and of any magnitude that it is capable of embracing; and the spring *e*, Fig. 2, throws open the shears as soon as it separates the branch, and is thereby rendered ready for a second operation. Fig. 2, is a view of the other side of the shears, nearly closed with the catch bar *f*, which is intended to keep them shut when not in use.

Fig. 3 and 4 are shears on the same principle, with long wood handles, and without a spring to throw them open.

Fig. 5 are a pair of long shears, to embrace several small branches at a time; they have long handles, and the joint is thrown below the cutting edges about three inches as shewn at *g*, and the chop *h* is confined close to the chop *i* by the staple frame *k*. These shears are rendered superior to all others, by the advantages of combining the drawing motion with that of the common shear and scissor motion.

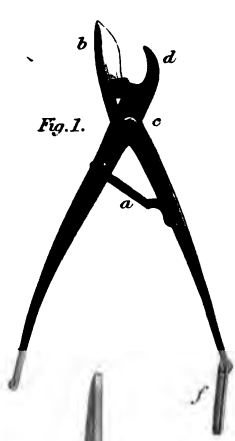
Fig. 6 is a view of these shears in a shut position.

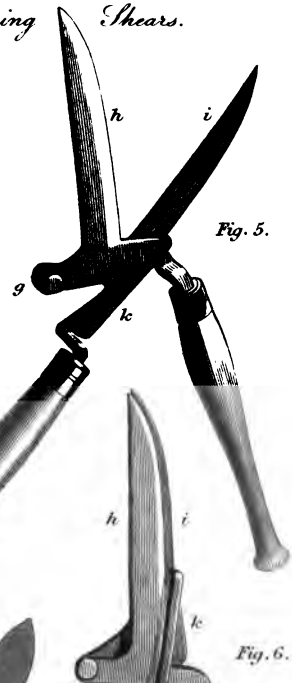
The SILVER MEDAL *was this Session voted to* HENRY JAMES NICHOLLS, *Esq. of Wood House, near Wisbeach, Cambridgeshire, for his useful method of preventing vicious Bulls from doing mischief. The following Communications were received from him (an explanatory Engraving is annexed) and a complete Apparatus is preserved in the Society's Repository.*

SIR,

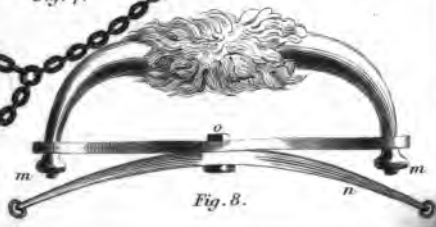
IT being a primary object with all classes of people and institutions to assist in preserving the lives of our fellow-creatures, I beg leave to recommend to the Society of Arts the apparatus I have invented to prevent bulls doing any mischief. I have adopted it for some time

Mr. J. Ogdens Pruning Shears.





Mr. Nicholls's Apparatus for vicious Bulls.



Drawn by Cornelius Varley.
Engraved by A.W. Warren

time and have now a bull wearing one, who prior to its being put on him, would attack a man either on foot or horseback, and in one instance had nearly killed a person. Since this preventive apparatus has been put upon him, he seems aware of the effect, and dare not face any one. He first tried it by rubbing his head against a post, when the lever caused the ring to hurt his nose, and he left it immediately. This apparatus prevents any bulls from lifting gates or breaking down fences with their horns, as immediately when the horn is attempted to be employed, the lever causes the ring to check the nose, which gives the animal instant pain. He then relinquishes the object, and does not make a second attempt. When we observe that the weight of a bull-dog will hold a bull's nose to the ground, we may readily suppose that he cannot or will not dare to attempt to lift much weight by his nose, and the lever is so constructed, as to cause every attempt made with the horn immediately to affect the nose. The straight bar from each horn may be either made of strong ash wood or iron. The swing lever should be made of iron. The chains and ring for the nose need not be very heavy.

Many valuable bulls have been obliged to be destroyed, and their breed lost, for want of means to prevent their doing mischief; and many lives have been lost by vicious bulls.

No bull, however quiet, ought to be without such a guard or preventive; it costs but little, is not unsightly, nor does it in the least injure them, or prevent their feeding. When a bull is guarded by one of these, he may with safety be turned amongst horses, or any other stock, without the least danger.

If my endeavours should be deemed worthy of the notice of the Society, it will give me great pleasure.

I remain,

Sir,

Your obedient servant,

H. J. NICHOLLS.

Wood House, near Wisbeach, Cambridgeshire,
Dec. 14, 1814.

To C. TAYLOR, M.D. SEC.

P.S. If a bull is very active and refractory, he may be prevented from running, or even walking fast, by placing a small weight upon either end of the swing lever; this would give the animal such pain, by throwing the lever out of its equilibrium, and constantly irritating the nose by any extra action of the body, that he would soon be glad to stop.

Reference to the Engraving of H. J. NICHOLLS's, *Esq. Apparatus for preventing vicious Bulls doing Mischief.*

Pl. 1. Fig. 7 and 8, shew a view of a machine to prevent vicious bulls from doing mischief with their horns. The iron bar *l* is screwed on the bull's horns by nuts *m m*, to the middle of which bar is attached a swinging iron bow *n*, which has a flanch in the centre, and which bow revolves on the pivot *o*. At the ends of the swinging bow are attached chains, which are connected to a ring fixed in his nose, so that which ever way he attempts to gore, the other end of the bow being elevated by it, pulls his nose in a contrary direction, and makes him desist.

The

The SILVER CERES MEDAL *was this Session voted to* H. B. WAY, *Esq. of Bridport Harbour, Dorsetshire, for preserving Carrots fit for Food during the Winter Months. The following Communications were received from him.*

DEAR SIR,

I OBSERVE in the Society's list of premiums one offered under the head of Agriculture, No 33, for preserving carrots, &c. fit for use, and which seems to have been offered some time without any successful claimant; I am therefore led to submit to the Society a trial I made last year, on a small scale, for preserving carrots for my own family use. I have, by the Schooner Alert, J. Hours, master, bound to Downe's wharf, sent a cask of carrots to your address. They were grown in my garden at this place, and were taken out of the ground on the 20th of August last, and have been out of it ever since; they were, when shipped on Monday last, as good as when first taken up, except that they require nearly double the time in boiling that young carrots do before they will be thoroughly dressed. Should the Society think the communication worth their notice, and wish for any further information on the subject, I shall give it with much pleasure, on being favoured with a line from you. In the mean time I am with great respect,

Dear Sir,

Your obliged and obedient servant,

H. B. WAY.

Bridport Harbour, March 21, 1815.

To C. TAYLOR, M. D. SEC.

DEAR SIR,

In reply to your esteemed favour of the 25th instant, I am glad to hear that the carrots are safe arrived. I am well aware that I fall far short of the conditions to enable me to claim the Society's Premuim; but should they deem me worthy of any part thereof, or a Reward, it will be most gratefully acknowledged.

The only thing I have to observe respecting the carrots is, that they were sown broadcast in the usual way, in my garden, at this place, March 23d, 1814, and thinned out as wanted for family use; and on the 20th of August following, they were all dug up, the greens and tops of the roots cut off and cleared from the earth that adhered to them, and immediately the carrots put in a dry cask, first laying a layer of earth on the bottom of the cask, and then a layer of carrots and earth alternately, till the whole be put in, and a cover put on the cask. The cask was then placed in a dry cellar, and remained there till sent to you. This is the second year that I have preserved them in this way; and I think them vastly superior to carrots that remain in the ground till the latter end of September or October, and then taken up and preserved. I boiled some of my carrots this day week, and thought them full as good as when they were first packed in the cask; but as I before observed, they require nearly double the time in boiling that carrots do when immediately taken out of the ground. I am, very respectfully,

Dear Sir,

Your obedient humble servant,

H. B. WAY.

Bridport Harbour, April 27, 1815.

To C. Taylor, M. D. Sec.

*** It appeared to the Committee, on minute examination, that the means adopted by Mr. Way for preserving carrots, is fully adequate to the purpose; and that where an opportunity offers of procuring proper casks, carrots may be preserved for many months, in this mode, either for exportation or home use, in a perfectly sound state.

FIVE GUINEAS *were this Session voted to Mr.* WM. BOWLER, *of Church Lane Strand, for an Apparatus for drying Corn or Pulse in bad Seasons. The following Communications were received from him, an explanatory Engraving is annexed, and a Model of the Apparatus is preserved in the Society's Repository.*

SIR,

I HAVE the pleasure to inform you, that after a long time and much trouble I have invented a machine, which is portable, and will dry grain or answer a number of other purposes. I think this machine is in many respects beyond any that I have hitherto invented.

1st, It is very portable, and may be easily removed from one house so another.

2ndly, The grain, or any article to be dried, may be turned by one man, and dried more equally than in the usual modes.

remain up with the seed-box suspended, as in Fig. 2, when, by placing a winch or handle on the square of the box-pivot *h*, the box containing the grain may be reversed, and the part which was uppermost will now be at the bottom, and the grain which has been dried be at the top.

By withdrawing the rods or bars *j j*, the box will be again lowered, and the grains which had been previously at the top will now be exposed to the heat.

In order to prevent the loss of grain in emptying the box, a hopper, Fig. 6, is to be attached to the machine at *k*, Fig. 1, at the bottom of which are hooks to hold a sack to receive the grain when dry; *l* is the ash-hole under the fire-place: *m* is a fender or guard, which may be slided up and down to close the fire-place, or regulate the fire; *n n* are iron bars, which may be drawn out for the purpose of carrying the machine by hand: *o* the small contrivance for baking and boiling.

As a portable machine by hand it will probably be too small to carry on the drying of grain to a sufficient extent, but may possibly be found very useful in drying late crops of beans or pulse.

A machine however on this principal may be constructed sufficiently large to answer any purpose of the farmer; the present one may be easily removed from house to house.

The inventor calculates that a portable machine to dry eight bushels of grain at once, and to be managed by one person would cost about twelve pounds.

*** The Committee on minute consideration of the apparatus, were of opinion it is ingenious, and may be useful on some occasions, but not to the extent supposed by the inventor.

PAPERS

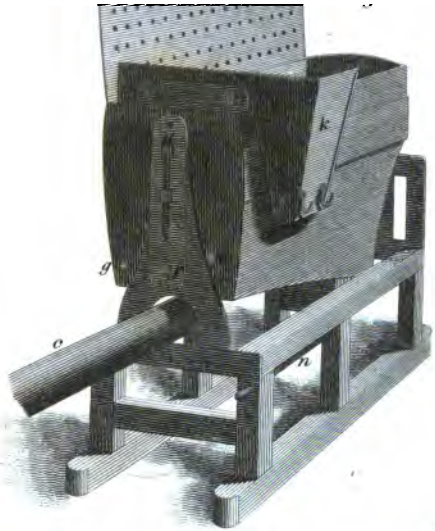
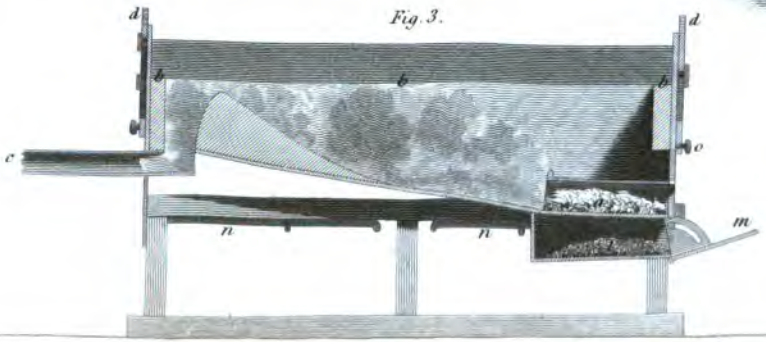
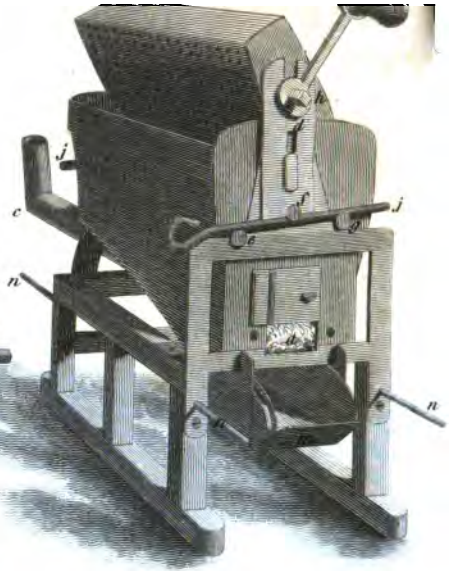


Fig. 5.

Fig. 4.

Fig. 3.





W. Newton, Chancery Lane.

E. Turrell. Sculp.

PAPERS

IN

CHEMISTRY.

FIFTY GUINEAS, *the Premium offered in Class* 93, *were this Session adjudged to Mr.* WILLIAM SMITH, *for a valuable six-sheet Mineralogical Map of England and Wales. The following Communication was received from him, and the Map preserved in the Society's Repository, along with a printed Explanation of the particulars of the Map.*

SIR,

I BEG leave to lay before the Society of Arts, &c. my mineralogical map of England and Wales. It is on a scale double the size of that required by the Society in their premium offered. I hope, on an investigation of its merits, it will entitle me to the premium and patronage of the Society. It has met with the approbation of many noblemen and scientific characters, who have examined it during its execution.

I remain, Sir,

Your obedient servant,

WILLIAM SMITH.

No. 15, *Buckingham-street, Feb.* 8, 1815.

To C. TAYLOR, M. D. SEC.

the curious, will become doubly interesting to their possessors and collectors, in the easy and pleasant clues they afford to the knowledge of the strata.

Such simple methods of acquiring useful and important information, may lead to a better knowledge of the various beds of coal and ironstone—the improvement of some of those works, and the extension of others; and it will undoubtedly deter many from the imprudent expenditure of large sums of money in searching for these valuable substances out of the regular course of their strata, where there can be no hopes of finding them.

Ascertaining also, that the metallic veins are confined to a particular part of the country, and found not only in particular strata, but in certain fissures of those strata, may check the the delusive mining projects into which many have been too incautiously led—extend the just notions of the practical miner, and excite his curiosity to new and unthought-of discoveries.

The various artists employed in building, from the humble brick-maker to the enlightened architect, are all interested in a method of discovering sand, clay, stone, slate, and other materials, and of selecting with certainty such as are best.

Fullers, founders, glass-makers, and potters, will learn where to obtain earths, sands, and clays, of the qualities best suited to their respective purposes, and sources of supply will probably be opened in plans of which they now entertain no idea.

Chemists, colourmen, vitriol, alum, and salt-makers, will learn how to trace the materials they have occasion for, and will be enabled frequently to obtain at once the different advantages of more convenient situations, smaller expense, and an improved quality.

The

The canal engineer will be better enabled to choose water-tight strata—to find them ost appropriate materials —avoid slippery ground or to remedy the evil—better supplies of water will be obtained for canals, and more of the heavy articles of tonnage, which alone can render them profitable, will be obtained from the strata, intersected or contiguous, or from new subterraneous supplies, which may be opened.

The contractor for such works may, from the same abundant sources of information, form his estimates with more certainty to himself, and more satisfaction to his employers.

A better knowledge of the sites and qualities of the different road materials is now become an object of national importance, and hence the necessity of showing the canals, on a map of the strata, by which any improved supply of these heavy articles may be readily ascertained.

The materials for the construction of ponds, reservoirs, and water for their supply, depend also on a knowledge of the strata; and the superior skill of some workmen employed in their construction, arises from a practical acquirement of such knowledge which they cannot explain.

The quackery of finding water by the divining rod, or other equally inexplicable mysteries, is completely done away, by a method of tracing the strata which produce the springs; and thus the important art of draining land, and of finding water for dwelling houses, is now reduced to a science dependant on a knowledge of the strata. It was upon this principle the author proceeded, in the important improvements he established for Mr. Coke, the Duke of Bedford, and others, in first draining, and then

irrigating their boggy land. The author, though not yet very beneficially employed for himself, has had the satisfaction of seeing thousands of acres drained and variously improved under his direction, on the principles established by the discoveries which will now be speedily published, to accompany the map of strata, and he trusts to a generous public for his reward.

WILLIAM SMITH.

No. 15, Buckingham-street, York Buildings, June 7, 1815.

To C. TAYLOR, M. D. SEC.

Explanation of Mr. WILLIAM SMITH'S *Map of the Strata.*

THE courses of the strata, or the length and breadth of surface occupied by each, as they rise successively from the level of the sea, on the eastern to the western side of the Island, are represented by colours.

The edges of the strata, which may all be crossed in a journey from east to west, are called their out crops; and the under-edge of each stratum, being the top of the next, and that being generally the best defined, is represented by the fullest part of each colour.

It is thus readily shown, that the most general course of the strata is from S. W. to N. E. and in some parts nearly north and south, whilst in the southern parts of the kingdom, many of their terminations have a contrary direction.

The

The colours, though brighter than those they represent, are in some degree assimulated to the colour of each stratum, except the chalk, which being colourless seems best represented by green, as strong colours are necessary, and there being no stratum of equal extent which required that colour.

In some cases where the strata are much alike, as the oxlytes, they are represented by light and dark yellows.

The strong blue colour represents the lias limestone, and the light blue, the blue marl which lies over it.

The light part of the black shade represents generally the strata which contain coal, more or less valuable, several beds of which are too thin for working.

The part most valuable and most worked is shewn by the greatest number of crosses which represent the sites of the collieries, and also by the darker shade.

In this mode of representing the strata by colours, various insular, or detached parts of the same colour may be observed.

Where these occur upon high ground (which will be known by attending to the ramifications of the rivers) they are intended to represent insular parts of the same stratum; but where they occur in low ground, which seldom happens but by the side of large rivers, they are intended to represent the denudated parts of a stratum, whose regular out crop may be at a considerable distance.

Instances of the latter occur in the green representations of the chalk, in Norfolk and Suffolk; and of the former in the yellow representations of stone-topped hills, in Gloucestershire.

The canals are added to this map for the purpose of shewing how the heavy articles of subterraneous produce may be best conveyed from their native sites in the strata

to the places of consumption. It may thus be seen what parts of the kingdom have benefitted most by canals, and where they are still wanting, and from whence the heavy articles of tonnage (which alone can render them profitable) may be the most readily obtained.

The SILVER MEDAL *was this Session voted to* THOMAS HOBLYN, *Esq. of Sloane-Street, for introducing extensively the Importation of Cocoa Nut Oil, from the Isle of Ceylon. The following Communications were received from him, an explanatory Engraving is annexed, of his improved Apparatus for preparing it; and samples of the Oil, and Preparation from it, are preserved in the Society's Repository.*

SIR,

As the advantages of the cocoa nut oil, which has been lately introduced into this country from Ceylon, in consequence of my suggestion, may not be so well known as it merits, I have sent to the Society various specimens of the oil, in its natural state, and in combination with substances now in common use, such as wax, spermaceti, &c. I have no doubt but that it may be very advantageously employed as a substitute for spermaceti oil, as it is considerably cheaper, burns with a clear bright flame, and is devoid of either smell or smoke. In using it in lamps, however, it will be necessary to render it previously liquid; but

but its own combustion will afterwards generate a sufficient portion of heat, to allow of the capillary attraction going on without further trouble. It will be found useful also in the manufacture of soap, candles, and the finer articles of perfumery, and become, in future, a source of great revenue to the Island of Ceylon, and of great importance to this country, if its preparation be more carefully attended to in the plan I have suggested, of breaking up the nuts with edge stones, then pressing them immediately, when reduced to a pulp, and boiling and skiming the oil and placing it in close vessels, for the purpose of being conveyed to this country. This mode of proceeding will not only render it more pure, but prevent its rancidity, and considerably lessen the leakage, which takes place from using common casks.

The vessels in question, I have had made after the model of the water tanks now employed in the navy, which contain about two tons each.

I have the honor to be,

Sir,

Your most obedient servant,

THOMAS HOBLYN.

Sloane-Street, March 8, 1815.

To C. Taylor, M.D. Sec.

Certificate.

I do hereby certify, that under the authority vested in me by the Lords Commissioners of his Majesty's Treasury, I have disposed of one hundred casks, containing about

 twenty

twenty tons of cocoa nut oil, lately imported from the Island of Ceylon, in the Emma and Monarch transports, which importation took place by way of experiment, on a suggestion from Mr. Hoblyn, the Deputy Agent for that Island; and from the experience of the manufacturers to whom the same has been sold, it will be likely to be attended with great utility and public importance.

W. HOWARD.

London, April 12, 1815.

*** The following articles were sent to the Society from Mr. Hoblyn, and specimens of them placed in the Society's Repository.

No 1. Cocoa Nut Oil in its common white congealed state.

2. A composition of half oil and half spermaceti.

3. A composition of half oil and half white wax.

4. A composition of one-third oil and two-thirds wax and spermaceti.

5. A candle formed of the last composition.

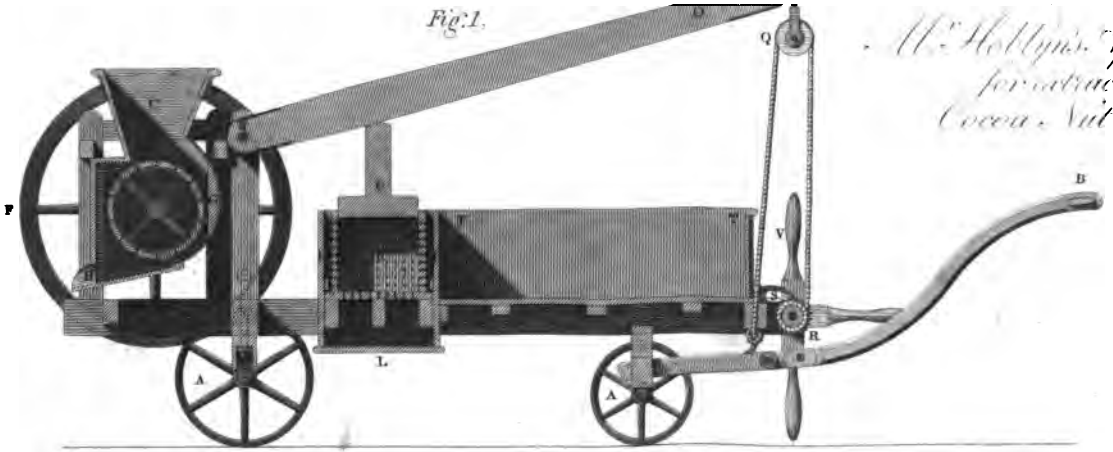
6. Cocoa nut oil soap in its crude state perfumed.

7. Cocoa nut oil soap prepared and scented.

8. A solution of cocoa nut oil soap in alcohol, useful in shaving the beard.

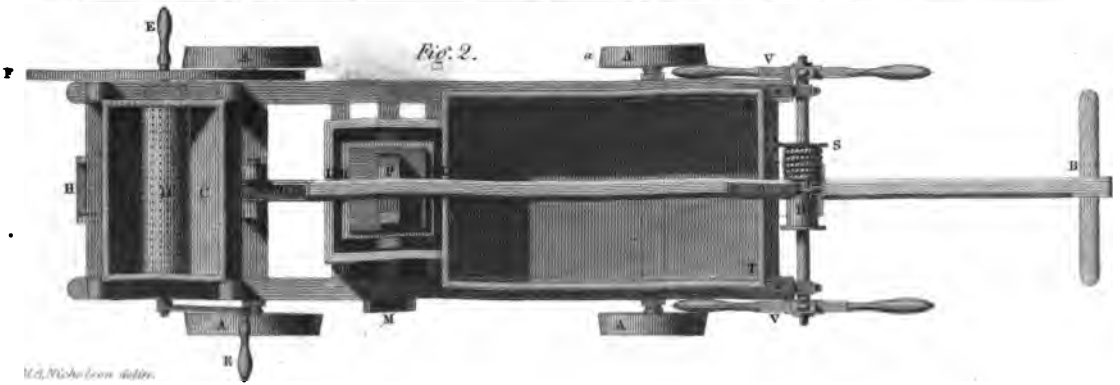
From further information given by Mr. Hoblyn, it appears of great consequence to government, to produce freight from the Island of Ceylon, now in their hands. That cocoa nut oil will immediately furnish them a remittance

Fig: 1.



Mr. Hobbs's Apparatus for extracting Cocoa Nut Oil.

Fig: 2.



W.G. Nicholson delin.

mittance of £50,000 annually, and could be much extended. That 150 casks had been lately imported at so low a rate as to be sold by Messrs. Hendrie, perfumers, in Tichbourne-street, at six shillings per gallon. Mr. Hoblyn added, that cocoa nut oil is likely to be in demand, on a very extensive scale, as he has already had an offer for 1000 tons of it.

Mr. R. Hendrie attended the Committee, and stated, that he had made three or four tons of cocoa nut oil into soap; that it makes a sweeter and purer soap than the tallow usually employed in making soap. That soap can be made cheaper with this than olive oil, and that it will cost about ten per cent, more than tallow soap. That cocoa nut oil burns very well in the Liverpool lamps, and gives a beautiful brilliant light without smoke, and that he has reason to believe it will be very advantageous to the woollen manufactory.

Reference to the Engraving of Mr. T. Hoblyn's *Apparatus (made under his Direction, by* Mr. Timothy Bramah, *of Pimlico) for the Extraction and Preparation of Cocoa Nut Oil. Plate* 3.

Fig. 1. Shews a section of the machine cut through its centre.

Fig. 2. Is a plan of the whole machine.

The machine is mounted on a carriage with four wheels, AAAA.

B. The pole by which it is to be moved.

C. The hopper, which conducts the kernel to the cylinder to be ground.

D is the cylinder, covered with plates of iron, perforated after the manner of a grater. At the ends of the axis of the cylinder are found two handles, E E, to turn the cylinder, and there is a fly-wheel, F, to regulate the motion of the cylinder.

G is a piece of wood, fixed to the back part of the hopper, so as to make an acute angle with the cylinder.

As the kernels are ground or grated by the motion of the cylinder, they are at the same time pressed down to the bottom part of the angle, which keeps them close to the cylinder, till they are all reduced to a pulp.

The pulp is conveyed to the sluice H, and then taken to the box K, for the oil to be pressed out.

K is a square box, with a great number of small holes to let the oil escape into the case L l, that surrounds the box, and conveys the oil to the sluice M, Fig. 2.

N O is a lever, moveable on a fulcrum at N, to press the mallet P into the box. At the other end of the lever is fixed a pulley Q. One end of a rope is fixed to the fore-part of a carriage; the other end goes over the sheave or block, and is made fast to the roller R. At the end of the roller is fixed a catch wheel S, with a catch to keep the rope firm. At the ends of the axis of the roller is fixed a cross V, or levers for turning the rollers. TTTT is a box, or cart, for holding the nuts, or any tools that may be required.

By Mr. Hoblyn's apparatus, three parts of the labour now employed in the manufacture of the oil may be saved, and consequently it may be afforded at a cheaper rate.

*** From

*** From subsequent experiments, it appears that the cocao nut oil soap may be used to advantage for medical and surgical purposes, in place of the foreign olive oil soaps, and that the oil is superior to tallow for use in enamellers' and jewellers' lamps.

FIVE GUINEAS *were this Session voted to Mr.* JOHN BAKER, *of Great Wild Street, for his Method of purifying Whale Oil. The following Communication was received from him, and an Apparatus for executing the business is preserved in the Society's Repository.*

SIR,

I HAVE found out a method of purifying common oil, and of making it equal to the best oil for lamps. I discovered this method in the course of last year; my master, Mr. Hoggray, No. 16, Russel Street, Covent Garden, usually burns my purified oil in an Argand's lamp, and has found it to answer perfectly in use, and the lamp will burn six hours without trimming. The expence of refining oil upon this principle is very little.

I usually purchase the unpurified oil at four shillings per gallon, and I sell it, when purified by this operation, at five shillings and sixpence per gallon.

I remain, Sir,

Your humble servant,

JOHN BAKER.

No. 25, Great Wild Street,
Dec. 14th, 1814.

TO C. TAYLOR, M.D. SEC.

Mr.

Mr. JOHN BAKER'S *Method of purifying Whale Oil.*

TAKE a garden flower-pot glazed internally and externally, and into the hole in its bottom compress a piece of clean dry sponge, so as to fit very tight in the hole, and so that part of the sponge remains above the hole, and part below it; then having placed any vessel as a receiver beneath, fill the flower-pot with the oil to be purified, it will percolate through the sponge into the lower vessel, leaving the impurities in the higher vessel, part attached to the sponge and part at its bottom. These impurities, or dregs may be scraped off the sponge with a spoon without removing the sponge, and the operation proceeded in many times before there will be a necessity to take out the sponge to be perfectly cleaned. The oil which has passed the sponge is then fit for use.

CERTIFICATES.

A CERTIFICATE was received from Mr. G. Hoggray abovementioned, stating that he had burnt Mr. Baker's purified oil the greatest part of the winter, and found a considerable advantage from its use, it burning equal to that for which he has given from six to eight shillings per gallon, and does not require so much trouble with the lamp.

ANOTHER Certificate was received from Mr. William Hawkes, No. 8, Great Wild Street, mentioning that he has burnt Mr. Baker's purified oil during the last six months,

months, and found it preferable to any he could get elsewhere.

A CERTIFICATE was also produced from Mr. A. Wylic, No. 150, Drury Lane, testifying that he has proved the burning of Mr. Baker's refined Greenland oil, and that it is much superior to the usual unrefined oils, giving a clearer light, with much smaller cotton, and producing less smoke, and that he considers it will be a considerable saving to the consumer.

Mr. R. HENDRIE, of Tichbourne Street, who has a general knowledge of oils, and was present at the Committee to see Mr. Baker's mode of filtration, thought it new and ingenious, and likely to answer the purpose.

*** The Society were aware that sponge had been before made use of in the purification of oils and other fluids, but after minute examination could not find any instance where the sponge has been applied in so cheap, simple, and efficacious a manner as in Mr. Baker's apparatus, nor so effectually in the purification of either oil or water.

PAPERS

IN

POLITE ARTS.

The SILVER MEDAL *was this Session voted to Mr.* PETER NICHOLSON, *of Oxford Street, for a new Centro-Lineal for drawing Lines to a vanishing Point. The following Communications were received from him, an explanatory Engraving is annexed, and a complete Instrument is preserved in the Society's Repository.*

SIR,

I BEG leave to send to you for the approbation of the Society of Arts, &c. a new combination of my invention for drawing lines to a point at any given distance out of the paper or drawing board. An instrument extremely useful in perspective, for drawing lines to a vanishing point, however remote, for dialling, for drawing the hour lines where the intersection of the style would run out of the

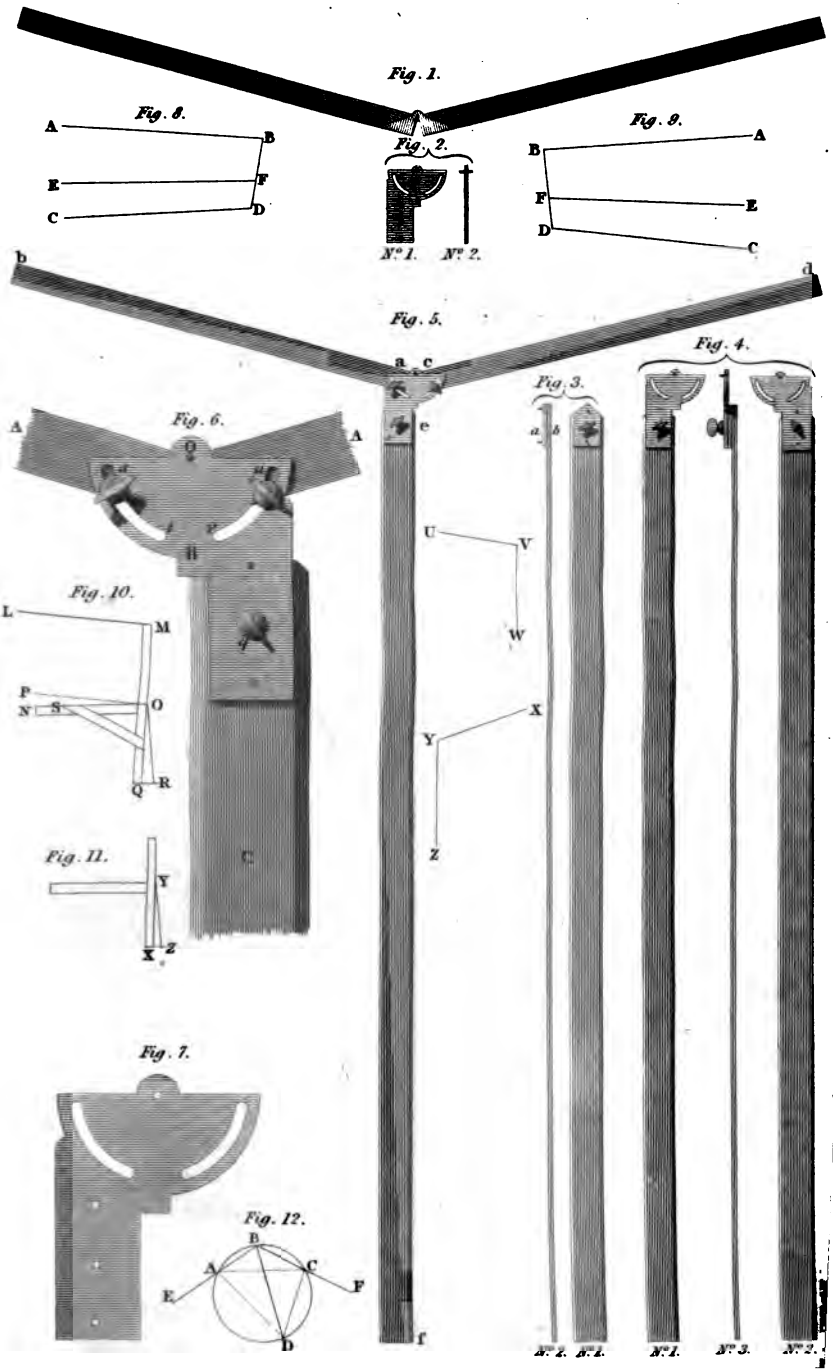
dial plane. In bridge building for drawing the radii of the arch stones where they are of different thicknesses; and in other numerous instances in Architecture that would be too tedious to mention.

It will perhaps be recollected by some members of the Society that I produced a combined Cyclograph and Centro-linead, on the bisecting principle, at the time when my improved method of squaring hand-rails was before them. I had however no intention then of laying it before the Society, and it was only when I heard that Mr. Farey, Jun. had it in contemplation to bring forward a somewhat similar invention of his in opposition to my addition to the parallel rules, so as to form a centro-linead, that I added a temporary wooden drawing-blade to my combined cyclograph and centro-linead, to make it more perfectly answer the purpose of a centro-linead.

Upon comparing it however with Mr. Farey's instrument, it appeared much superior to it, as, in setting his for use he had recourse to several trials, first to draw a line to cut the two given lines at equal angles, and then to set each of the angular limbs of the instrument separately; whereas in my instrument, by a very simple geometrical problem, I set it at once.

My intentions of showing my altered Cyclograph and Centro-linead to the Committee at the time when Mr. Farey's instrument was before it, was to show that I had neither taken the principle of Mr. Farey's instrument from him, nor worked upon his invention, as I can produce witnesses to prove the contrary. The idea of it occurred to me more than twenty years ago, and five years since I shewed the principle of it both to Mr. Robert Gibson of Hampstead, an ingenious watchmaker, and an excellent geometrician, and also to Mr. Cornelius Varley; and it is

Mr. Peter Nicholson's Centrolineal



more than two years since I also shewed it to Mr. Gill, one of the chairmen of your Committee of Mechanics. In the course of that evening, when Mr. Farey's instrument was before the Committee, several of the members expressed their approbation of mine, and wished me to bring it before the Society.

I accordingly turned my thoughts towards its improvement, and the result has been that I discovered that it was not necessary for the drawing blade of the instrument to bisect the other two limbs that slide along the pins, and therefore that it might be constructed in a much simpler manner, and be applied to practice with far greater ease than on the bisecting principle, as the pins may be fixed in any manner whatever, but out of the space contained between the two given lines, and no geometrical operation is necessary in setting it for use. The instrument I shewed to the Committee cost me four guineas; this however can be made for less than eight shillings, and is more convenient for drawing lines on paper than that of mine rewarded by the Society on the principle of the parallel ruler, which however is superior to this for the use of engravers. Should the Society approve of this new instrument, I will furnish a complete description of it, and a geometrical demonstration of the principle upon which it is constructed.

I am, Sir,

Your obedient Servant,

PETER NICHOLSON.

No. 10, Oxford Street, London, Feb. 9, 1815.

To C. Taylor, M. D. Sec.

Description

Description and Properties of the Instrument.

In making large perspective drawings of objects to be viewed at long distances, very great inconveniences generally occur to the delineator, on account of the vanishing or other parts running out to distances which require the use of a very long ruler inconvenient to handle, and the whole length of the apartment for his own use, and very frequently the vanishing points are so remote as to exceed the length of any moderate room. In order to obviate the last of these inconveniences, the draughtsman is either under the necessity to shorten the distance of the point of view, and thus giving a very distorted representation of the object, or first to make a drawing on a small scale, and then to enlarge it.

Other means have also been resorted to:—one practical method is by proportional scales at each end of the drawing-board; thus, if the object to be represented be a building, having all the parts on the plan at right angles to each other, two scales at each end of the drawing-board become necessary, but this method requires very great attention, and is liable to great inaccuracy, particularly in drawing lines at very near distances from each other. Another method which the delineator has recourse to, in order to draw lines to a remote point out of the drawing-board or tables, having two given lines inclining to each other, and a point through which it is required to draw a third line tending to the same point with the two given lines, is by drawing two parallel lines so as to be intercepted by the two given lines, one of the parallel lines being made to pass through the given point, and through the point of division, will tend to the same point.

Another method is by finding the representation of two points

points of any original line, and drawing a line through these two points.

These methods, as well as others which might be mentioned, are attended with intolerable labour, and liable to very great inaccuracy, and the constructive lines embarrass the work, and render the operation intricate and confused.

To draw lines with facility to tend to a remote point at any given distance, has therefore been justly considered as a desideratum in perspective. To accomplish this object, Mr. Peter Nicholson, No. 10, Oxford Street, has invented two instruments, called *Centro-lineads*, for which he has been honoured with the approbation of the Society of Arts. One of these Instruments, well adapted for the purposes of engraving, was rewarded last year (1814), and the Society have this year voted to him for his invention and ready mode of adjusting of the other, the Silver Medal. This last centro-linead is well adapted to perspective delineation, and performs its office with as much facility as parallel and perpendicular lines, may be drawn by a common square on the edge of a drawing-board, and even with greater accuracy, the latter depending on the edge of the board, and the stock of the square being straight. This instrument is not entirely confined to the use of drawing lines to a point, but will also draw parallels with the same facility.

Description of the Centro-linead for Delineation.

This instrument consists of a joint rule, each leg of which is in length similar to a carpenter's rule. The knuckle is pierced with a small hole through the centre of

the rivet, to admit of a blade being fitted to it, in order to draw the line as required. Each edge of the blade is made quite straight, and may either be parallel to each other, or be made to taper, so as to render it light. In constructing the instrument the broad end of the blade (should there be any difference) must be placed next to the joint of the legs to those which fold or shut together, and one of the edges must tend to the axis of the cylindric rivet. This edge is called the drawing or fiducial edge; and thus the blade is fixed upon the side of the legs next to the external angle, and the whole is clamped or fastened together by means of a semicircular plate of brass, which has a circular slit or grove next to each edge. One edge of the brass plate is straight, and forms a diameter to the semicircle; from this diameter another small semicircle projects equal to or less in diameter than that of the knuckle, so that each of these semicircles may have the same common centre, viz. the axis of the rivet. The brass plate is extended beyond the circumference of the greater semicircle, in order to attach the blade, and is pierced with a small hole in the direction of the axis of the rivet, and a steady pin is inserted and made to project outwards from each face of the brass plate, so as to fit the hole exactly. In order to keep the two legs together, so that either side of the brass plate may adjoin the faces of the legs, which are always in the same plane, whatever angle they make with each other.

Each edge of the legs which shut together is in the same plane with the axis of the rivet, and these two edges are called the sliding edges. Each of the slits next to the larger semicircular part of the plate, is the arc of a circle, concentric with both semicircles. The brass plate is fastened to the legs by a screw inserted through each slit,

and

and tapped into each leg. The extended part of the brass plate on the convex circumference of the greater semicircle, is also pierced, and a screw inserted through the hole, and tapped into another rectangular plate; and to keep the drawing or central edge of the blade so as not to be moved; when the instrument is clamped by the screws, two metal steady pins are made fast to the lower plate, and the upper plate with the two semicircles and projecting part is pierced to receive them. The two steady pins are placed in a straight line, passing longitudinally along the faces of the blade, and dividing it into two equal and similar parts. Two of the sides of the legs must be in the same plane with one of the sides of the blade. The blade is made to fix upon either side of the plate, and either side of the plate, as before mentioned, to the same side of the legs, so that the drawing edge may be reversed, as the vanishing point may be on the right or left hand. The drawing edge of the blade must be made to form any given angle with the sliding edges of the legs; and either of the angles must be made moveable, while the other is stationary, and may be made to fix at pleasure.

The Centro-lineal may be provided with blades of several lengths, in order to accommodate drawings of various sizes. The two edges of each of the legs should be parallel, so that either of the opposite edges of the same leg and the drawing edge may form the same angle, for the convenience of setting the instrument to any given angles required.

To use the Centro-lineal.

Let two converging lines be given: draw a straight line so as to be intercepted by the converging lines: let the two angles which are made by the drawing edge and the

two sliding edges be called the *angle of the instrument*, as the angle formed by the two sliding edges is regulated by them, and let the edges of the legs opposite the sliding edges be called the *outer edges*. Unscrew one of the angles of the instrument, and set that angle to one of the angles formed by the transverse line, and one of the converging lines, then clamp the angle thus set: unscrew the other angle, and set the angle now unscrewed, to the remaining angle formed by the transverse line, and the other given line, and clamp the angle of the instrument now set. Put a pin in each of the angles formed by the two converging and intercepted lines: place each of the sliding edges upon each respective pin, and suppose any given intermediate point, between the two converging lines; slide each edge upon each pin, until the drawing edge fall upon the given point; then keep the instrument stationary; draw a line along the drawing edge, and the line thus drawn, will tend to the same point with the two given lines.

Reference to the Engraving of Mr. NICHOLSON'S *Centrolineal. Plate* 4. *Fig.* 1 *to* 10.

Fig. 1, a representation of the legs or joint rule, with a cylindric hole in the axis of the rivet, and with a hole in each leg to receive the screws.

Fig. 2, a representation of the brass plate: No. 1, shows the face with the two circular grooves, and a pin in the centre, and with three holes in the projecting part: No. 2, is an orthographical representation of the brass plate on edge with the centre-pin, projecting alike on both sides: each

each end of the pin being made to fit the hole through which the axis of the rivet passes.

Fig. 3, a representation of the blade which is champhered on each edge with a projecting rectangular plate on the top, soldered to the blade, and thereby forming one solid: No. 1, shews the top of the blade with the projecting part, which has a steady pin near each end of it, and a hole tapped to receive the screw in the middle: No. 2, a representation of the edge of the blade, shewing the projecting part and the two steady pins.

Fig. 4 represents the semicircular plate fig. 2, fastened to the blade fig. 3, by means of the screw and steady pins of fig. 3, being made to fit the holes of the plate in fig. 2, exactly; No. 1, is a representation of the top: No. 2, another representation of the top, in which the other side of the plate, fig. 2, is laid downwards, so that the edge which is directed to the centre of the pin in No 2, is upon the contrary side of the blade to that which it was in No. 1: No. 3, a representation of the edge.

Fig. 5, a representation of the Centro-linead, with all the parts screwed together, in order to be applied for the drawing of converging lines: a b, c d, are the folding or sliding edges; e f is the fiducial, or drawing edge of the blade; Θ is the projecting pin of a cylindric form, the axis of which coincides with the axis of the rivet, and is perpendicular to the plane of the instrument, and fixed in a straight line with the edge f e of the blade, and the edges b a and d c of the legs.

Fig. 6, part of the Centro-linead, screwed together, to half the real size: *s* and *u* are finger screws, inserted in the slits *s t* and *u v*, and tapped into the legs A, A. The under side of the blade C, and the under side of the legs A, A, are in one plane, in order to coincide with the surface

of the paper or drawing. From this consideration, it becomes necessary to make the thickness *a b*, fig. 3, No. 2, of the blade and rectangular plate together, equal to the thickness of the joint rule, fig. 1; since the under side of the plate is in the same plane with the upper side of the legs, which are parallel to the plane of the paper: b ⊙ f and d ⊙ f, fig. 5, are here termed the angles of the instrument, and the point ⊙ is called the centre of the instrument.

Fig. 7, a representation of the brass plate to half the real size.

Application, Plate 4.

To set the instrument to any two given angles. Let UVW and XYZ be the two given angles; place the centre ⊙ upon the point V, and the edge ⊙b upon the straight line VU, then slackening the screw to permit the edge ef of the blade to revolve on the centre ⊙; revolve ⊙f until it fall upon VW, while the edge ⊙b remains upon the line VU, then tighten the screws, and the angle b⊙f will be equal to the angle UVW.

In the same manner the angle d ⊙ f may be set to the angle XYZ, by placing the centre ⊙ upon Y, and ⊙d upon YX, and slackening the screw *u*, and revolving the edge f⊙ until it coincide with YZ; then tightening the screw *u*, the instrument will be set.

Any two converging lines, A B, and C D, Fig. 8, and a point E between them, being given in position, it is required to draw a straight line through the point E, that shall tend to the same point with A B and C D.

Draw

Draw any straight line B D, intercepted by A B and C D, and by problem 1, set one of the angles b o f of the Centro-lineal to the angle B D C, and the other d o f to the angle D B A; put a pin or needle in the point B, and another in D: then, laying the Centro-lineal with its proper side upon the paper, place the sliding edge a b, upon the pin B, and the sliding edge d e, upon the pin D; then slide the legs upon the pins B and D, until the edge e f, of the blade fall upon the point E; then keeping the instrument stationary, draw the line E F, and all the three lines A B, C D, E F, would, if produced, meet in the same point, as will be demonstrated.

N. B. If the converging lines A B, and C D, fig. 9, should tend to a point on the other hand, the instrument must be thus reversed:—take out the finger-screw *g* of fig. 6, and take off the blade, fix it on the side of the brass plate now uppermost, then take out the screws *u* and *s*, turn the plate B, so that the side which was before the top, will now be underneath, and coincident with the upper sides of the legs, and the pin C, will again be inserted in the hole in the axis of the rivet; then insert the screws through the slits of the brass plate into the legs; then the instrument may be set and used as before.

A very useful Method of setting the Instrument by trial.

If we were required to draw lines to tend to the same point, the pins may be fixed in any two points out of the two given lines, and out of the space which they include; thus, place the Centro-lineal upon the pins, and slide it along them, until the drawing edge either fall upon, or

cross one of the given lines, then loosen the screw next to the farthermost pin, and move the angle more or less, pressing the legs gently upon the pins, until the drawing edge coincide with the line; then, fastening the screws, slide the legs upon the pins until the drawing edge coincide with the other given line or cross it; then, if the drawing edge coincide, the instrument is set; but if not, the screw next to the pin now the most remote, must be loosened, and the Centro-lineal must be set as before. The instrument must then be returned to the first line, and if it agrees with it, it is set; but if not, the screw which is between the drawing edge and the remote pin must again be slackened, and the angle moved as before, until the blade coincide with the line; then make the screw fast, and the instrument will be set.

In some cases it will require to be returned to the other pin, but in general four movements will be sufficient. This method of setting the Centro-lineal by trial is very useful in general cases; as, suppose in perspective the vanishing line of the horizon, and another line tending to a vanishing point in the vanishing line of the horizon to be given; it will be very convenient to set the Centro-lineal so as to draw lines without the two given lines, as there is generally a part of the perspective drawing below the vanishing line of the horizon, more or less depending on the height of the eye above the level of the plane on which the object is situated.

Though a perspective drawing may be finished with one Centro-lineal, whatever be the number of vanishing points; yet to prevent the frequent setting of the instrument, it will be much more convenient to employ two.

To make a temporary Centro-lineal: let LM and NO, fig. 10, be two given lines; draw any straight line M O Q, upon

upon which place the straight edge of a ruler; fix the straight edge of another ruler upon N O, fasten these two straight edges by means of a brace, then fasten the piece Q O R to the straight edge M O Q, so that the angle Q O R may be equal to the angle P O N, which is formed by drawing O P parallel to L M, and the whole thus constructed will be an immovable Centro-lineal.

A common square, fig. 11, may be converted into a Centro-lineal, by the addition of a triangular piece X Y Z, and thus may be very useful when a drawing is long in hand.

Since writing the above explanation, the instrument has been improved, and made to slide to the centre of the rivet;—by this means it may be set at once upon the pins, which is a very great convenience; and the joint is so contrived as to admit of legs of different lengths, as well as blades of different lengths.

To demonstrate the Properties of the Instrument.

Let A B C D be a circle, and let A and C be two fixed points, and let B be any intermediate point in the segment A B C; join B A and B C, producing B A to E, and B C to F. Then because the points A and C, and the angle A B C are given, the point B is in the circumference of a given circle, and because the point A, and the angle A B D, and the circle A B C D are given, the point D is also given: therefore if while the rules B E and B F, slide upon the pins A and C, the middle rule B D will always be upon the point D, or tend to the point D, should B D not be so long as to reach D.

The

The THANKS *of the Society were this Session voted to Mr.* CORNELIUS VARLEY, *42, Newman-Street, for his Improvement of a portable Easel for Painters. The following Communication was received from him, an explanatory Engraving is annexed, and an Easel on this Construction preserved in the Society's Repository.*

DEAR SIR,

I BEG leave to present to the Society of Arts, &c. a Portable Easel on Mr. Williams's construction, but so simplified that any carpenter can make it as cheap as his ordinary work. The wood-work cost seven shillings, the strap-hinge, five screws and steel, about one shilling; so that the whole price is eight shillings. I mentioned that Mr. Cobley, joiner and frame-maker, Evelyn's-buildings, Oxford-street, makes them for that price.

I am, Sir,

Your very humble servant,

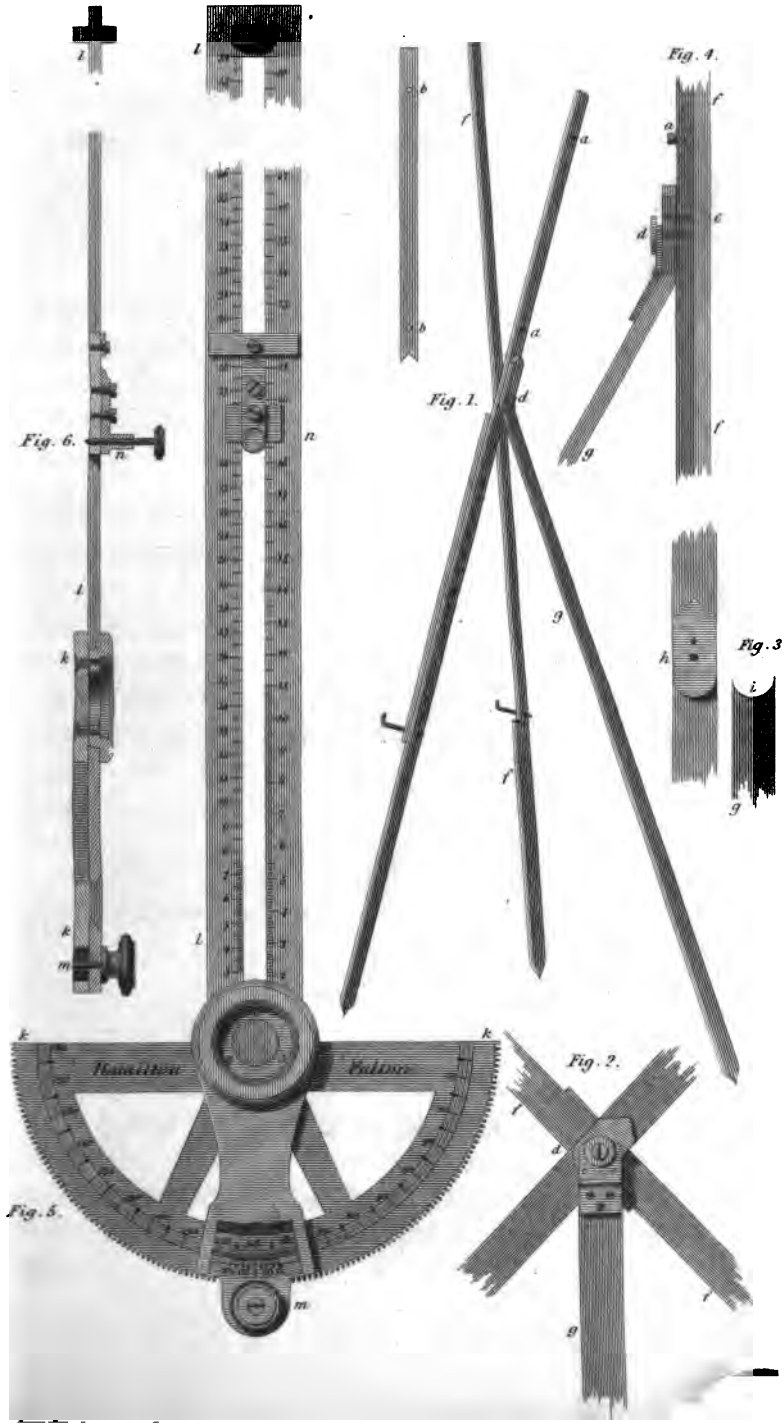
CORNELIUS VARLEY.

Reference to the Engraving of Mr. CORNELIUS VARLEY'S *Portable Easel, Pl. 5, Figs.* 1, 2, 3, 4.

Fig. 1, shews a back view of the Easel, the mode of opening it, and the place of the joints.

The

Mr. Fulton's Protractor. Mr. C. Varley's Eas



The improvement consists in making two joints with common wood screws, one for the front cross bar *f f*, to turn on the other for the prop *g*, and so near together as to be quite as good, and a great deal cheaper, than those heretofore sold.

Fig. 2. shews the joint of the prop *g*, made with a long brass strap-hinge, fastened to the Easel by one screw *d*, through a brass collar, under which the hinge can move, but so tight as not to slip of itself.

Fig. 3, shews the block *h*, glued to the Easel, rounded at bottom to fit the hollow *i* of the prop, over which the hinge is fastened.

Fig. 4, is a side view or section, to shew how the two screws which form the joints, are placed one above the other. The front screw *c* has a square collar under its head let in flush to the Easel; *d* is a sound collar under the back screw head, to keep the hinge close; both these screws have a double thickness of the wood for their threads to hold in, so the joints are quite strong and sound.

This Easel is made out of ¾-inch stuff, and nearly two inches wide, so that when shut up, it makes a square pole nearly two inches thick, and six feet six inches long, but, if made longer, I should recommend the joints to be kept about the same distance from the bottom, viz. four feet six inches; *a a* are two wood studs on which the piece *b b* used as a rest are placed when the apparatus is closed and not in use.

CORNELIUS VARLEY.

The

The SILVER MEDAL *was this Session voted to Mr.* HAMILTON FULTON, *of Newman Street, Oxford Street, for an improved Instrument which unites the properties of the Protractor, Scale and Compasses. The following Communication was received from him, an explanatory Engraving is annexed, and the Instrument is preserved in the Society's Repository.*

SIR,

THE instrument which I have now the honor of submitting to the Society of Arts, &c. unites the protractor, scale, and compasses, and by one operation, determines the quantity of the angle, and the depth of the line.

For example, it is required from a given line to lay down an angle of sixty degrees, and a distance of twenty-five feet, yards, chains, or miles. The first thing to be done is to place the inner edge of the slider at twenty-five on either of the scales; (this may be done before or after the instrument is laid on the paper), then place the diameter of the semicircle to the base line, and the cross at the centre upon the point of the angle; next move the nonius to the required quantity of the angle 60°; press the pricker on the paper, and the point is the edge and distance required.

This instrument I have used very advantageously in my business, about six years; it may be applied to any purpose requiring the use of the three instruments above.

abovementioned, but will be more particularly useful in laying down land surveys, ships' courses, &c.

I am, Sir,

Your obedient humble servant,

HAMILTON FULTON,

Land-Surveyor.

9, *Newman Street, January* 18*th*, 1815.

To C. TAYLOR, M.D. SEC.

A further Example of the Application of Mr. FULTON'S *Instrument.*

SUPPOSE it was required to construct a right-angled triangle, of which the hypotheneuse is 50 feet, and the angle at the base 35 degrees;

Subtract 35° from 90°, and there remains 55°, which is the other angle of the triangle. Draw a straight line, place the inner edge of the slider at 25°; set the nonius to the angle of 35°; then place the cross at the centre upon a given point in the straight line, and bring the pricker to the said line, and press it down, which will mark off the distance required; then by the edge of the semicircle, which makes the acute angle, draw a straight line of any indefinite length for the base; remove the instrument and set it to the remaining angle 55°; place the cross in the centre upon the point made by the pricker, and bring the pricker again to the line, which will fall upon the point where the centre of the instrument was placed; the instrument being now turned the one end for the other, draw another straight line by the diameter of the semicircle forming the acute angel,

angle, which must now be upon the same side of the line as before; then continue the two straight lines till they meet, and the triangle will be constructed as required.

References to the Engraving of Mr. FULTON'S *Instrument, or Protractor, Pl. 5, Figs. 5, 6.*

Fig. 5—The letters *kk* shew the protractor drawn half the real size.

l l—The scale.

m—The pinion to move it.

n—The pricker or compass point.

Fig. 6—Shews a section of the instrument.

PAPERS

IN

MANUFACTURES.

TEN GUINEAS *were this Session voted to Mr.* EDWIN JONES, *of Southampton, for his Machine for serving Ships' Ropes by one Person only. The following Communication was received from him, an explanatory Engraving is annexed, and a Model of the Apparatus is preserved in the Society's Repository.*

SIR,

HEREWITH you will receive an apparatus of my invention, for the purpose of laying or serving ropes single handed. It is necessary to observe, that in the common mode of serving ropes, two persons are usually employed, one to hold and manage the ball of spun yarn, the other person to lay it with a machine, resembling a wooden mallet, with a groove in the head to work in the rope to be laid.

laid. By my plan, I can save the expence of the man who usually manages the ball of yarn; and for this purpose I have attached a reel to the serving mallet, and the yarn for laying the rope being wound on the reel, and passing under a pulley, from thence between two others to the rope, and the reel and apparatus all turning round together, the rope is laid by one person managing the whole.

From being disappointed by a person who should have assisted me in laying ropes in the common way, I was led to invent this apparatus, and I have by this means served or laid forty-two yards of rope in one afternoon. I have served five-inch ropes in a similar manner. The yarn is wound upon the reel, by means of a handle, in less time than on balls, and the whole work is done as well and with more expedition than in the common mode.

When I work with a large machine, I add a lead counterpoise to balance the motion of the reel.

I am, Sir,

Your humble Servant,

EDWIN JONES.

Southampton, Dec. 29, 1813.

To C. TAYLOR, M. D. SEC.

Reference to Mr. EDWIN JONES's *Machine for serving or laying Ships' Ropes. Pl.* 6. *Figs.* 1, 2.

Fig. 1, is a representation of the machine in a working state. A is the box or case, which encloses the whole machine. B C are the uprights, which are connected to the

the ends of the box A, and supported by the diagonal braces. DE, one part of the rope, is made fast round the upright C, leaving out a length to be laid nearly equal to the distance between the uprights B, C; to the upright B is attached an iron frame *c*, which has a hook *e* that receives one end of the rope, and by means of the eye screw *b* the hook *e* is made to traverse in a lateral direction, by which the rope between the uprights B C is stretched. Fig. 2, is the reel apparatus, which contains the line, twine, or cord, that is to serve or cover the rope F; the reel *f* revolves upon two pivots, and the line upon it passes through the guide-pulley *i*, and between the rollers or pullies at *k*, and by means of the handle of the reel apparatus, it is thrown in a spiral or screw direction along the whole length of the rope till the rope is completely covered or served. The reel apparatus or frame is confined upon the rope by two standards *h*, that encompass the rope, and according to the diameter of the rope is the pin passed through that set of holes in the standards that are best adapted to its size. This machine is simple, efficient, and portable, and will be found to be superior to any machine used for that purpose in the particulars specified.

TEN GUINEAS *were this Session voted to Mr.* THOMAS SCORRAR, *Green Street, Bennet's Row, Blackfriars Road, for a Machine for Smoothing or Blocking Straw Hats. The following Communication was received from him, an explanatory Engraving is annexed, and a Model of the Machine is preserved in the Society's Repository.*

SIR,

I HAVE invented a machine for blocking straw hats, which I have sent to the Society, in hopes it will meet their approbation. The model now sent is half the size of the real machine. The price of a proper machine is £6. 10*s*. 0*d*. which money the workmen, at the common price of six-pence per hat for blocking, can gain by its use in one week's time.

A steel face is soldered on the box containing the heater, in order to give a better polish to the hat.

I am, Sir,

Your humble servant,

THOMAS SCORRAR.

Green-Street, April 25, 1815.

To C. TAYLOR, M. D. SEC.

CERTIFICATES.

THIS is to certify, that the machine invented by Thomas Scorrar, for blocking straw hats, has given general satisfaction.

Mr. Edwin Jones's Machine for Serving or Laying Ships Ropes.

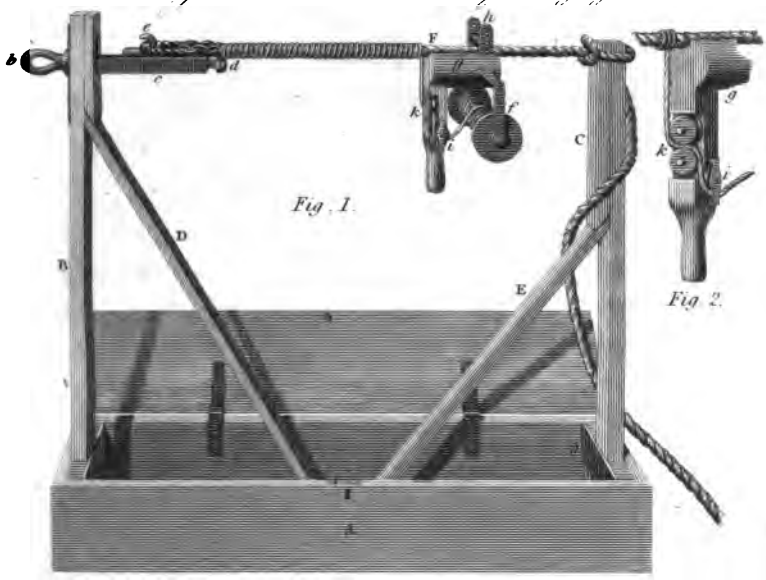


Fig. 1.

Fig. 2.

Mr. T. Scorrar's Machine for Smoothing Straw Hats.

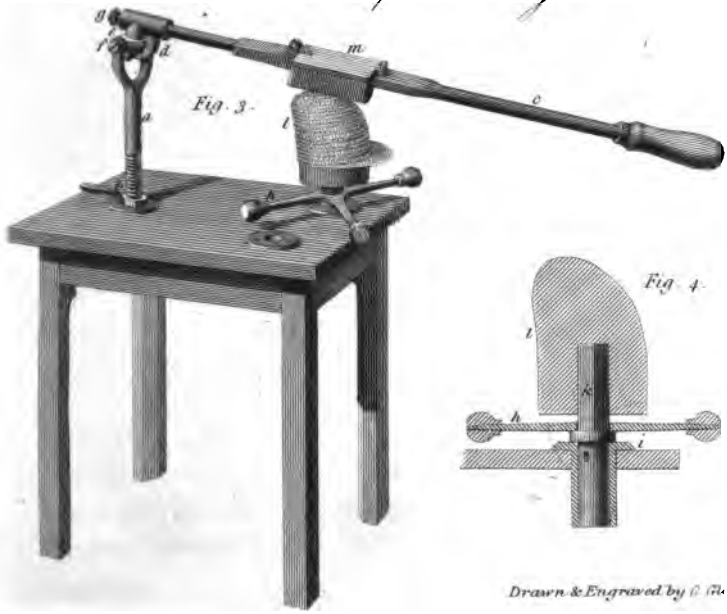


Fig. 3.

Fig. 4.

Drawn & Engraved by G. Gadsby

satisfaction, and is much to his credit; for we can block fifty hats in a day sooner and with much more ease than we could block twenty in the usual way. This is only part of its utility, for having so much power with the lever, and going quick over the straws, it prevents the straw from being injured in colour. In the common mode, the hand-iron is obliged to remain longer on the straw to press it down, and discolours the straw much; besides which inconvenience, many persons have fallen victims to disease, from the labour of pressing with the hot iron against their breasts, which this machine will prevent. Witness our hands, April 25th, 1815.

SAMUEL NICHOLLS, Straw Hat Manufacturer, at No. 5, London-Road, Southwark.

THOMAS SWINSCOW, Stone's End, Bow.

WILLIAM MORRIS.

Reference to Mr. SCORRAR's *Machine for Smoothing and Blocking Straw Hats, &c. Pl.* 6. *Figs.* 3, 4.

FIG. 3, is a representation of the machine, in a combined and working state, with a straw bonnet on the block; a is an iron standard, screwed on the stem, and which passes through a table, and to which it is fixed at any required height by means of two counter nuts or lock bars, one acting against the under, and the other upon the upper surface of the table, as shewn at b. The upper end of the standard is forked, as at e, to receive the socket piece d, through which a screw or pin passes at f, which gives to

the lever c the power of being moved in any direction. The lever c slides and turns through the socket piece d, and a nut or stop at g prevents the lever c from being drawn out of the socket b. Fig. 3, is a block upon which a bonnet is placed, and which fixes on the iron spindle k, fig 4, which revolves in a brass or iron socket which is screwed upon the table. The cross lever h turns the block and spindle in the socket, and thus presents any part of the bonnet to the box iron m, attached to the lever c. A red hot iron is enclosed in the box m, the lid of which has a joint which admits of its opening, and a button or catch which keeps the lid shut during the operation of ironing or smoothing the bonnet. By this machine any size or figure of a bonnet and hat may be ironed or smoothed with great dispatch, accuracy, and convenience to the operator.

Fig. 4, is a section of the block, spindle, and lever, the same as described in fig. 3.

PAPERS

IN

MECHANICS.

The GOLD MEDAL *of the Society was this Session voted to the Chevalier* PAUL ASSALINI, *Physician to Prince Eugene of Munich, for his Improvements in Surgical Instruments and Operations. The following Communications were received from him, four explanatory Engravings are annexed, and a Collection of the Instruments is preserved in the Society's Repository.*

SIR,

DURING twenty years of medical and surgical practice in hospitals and armies on the continent, I have made improvements in many surgical instruments, and invented others, which diminish the difficulties attending operations, and render their success less dubious. The instruments have been examined by some of the most eminent Surgeons in London, and their approbation of them has

encouraged me to express to the Society of Arts, &c. the desire which I have to submit them to their inspection and respectable opinion, before I return to Italy.

I have the honour to be,

Sir,

Your obedient servant,

PAUL ASSALINI.

7, Manchester-Street, Manchester-Square, London.
October 25, 1815.

To C. Taylor, M.D. Sec.

Certificate.

Chevalier Assalini, Professor of Surgery at Milan, being desirous of carrying into Italy some testimony of the degree of estimation in which his ingenuity and professional merits were held by men of science and practitioners in surgery in London, we have much pleasure in complying with his request, and declaring that we are induced, from every thing we have seen, to rank his talents very high, and to consider his contrivances for the relief of wounded men, very ingenious.

Joseph Banks, P.R.S.

Everard Home.

Soho-Square, London, Nov. 15, 1814.

My Dear Sir,

I regret that we are so soon to lose your company; nor can I let you depart from this country, without testifying my sense of the gratification and information I have derived from your society. The candour and liberality with which you have communicated important professional information, the ingenuity you have displayed, in the construction of various surgical instruments, and the unremitting attention which, it is evident, you have paid throughout life, to the advancement of professional knowledge, have impressed me with sentiments of respect and regard for your character, with which, be assured, I shall always remain,

Your sincere friend and servant,

John Abernethy.

Bedford-Row, Nov. 17, 1814.

To Professor Assalini.

I have examined the instruments of the Chevalier Assalini, with all the attention in my power. They mark a mind of superior ingenuity, and one very fertile in contrivances to lessen the difficulties of operations. Those which have struck me, as deserving more than common praise, are, first, the double forceps, well adapted to take up an artery separately from the accompanying nerve, or when situated so as to be deeply buried.

Secondly, his forceps for aneurism, are well adapted to produce the object which he has in view. This, how-

ever, is said without meaning to decide upon the superiority of such an operation for aneurism over others.

Thirdly, his instrument for making an artificial pupil, which appears to me peculiarly adapted for the purpose.

The kind notice which he has taken of the labours of others, in his work on the Artificial Pupil, manifest a liberal spirit, and a mind anxious to improve the profession, of which he is an ornament.

ASTLEY COOPER.

The forceps I used in an operation yesterday, and found them to answer extremely well.

October 8, 1814.

PROFESSOR ASSALINI, having demonstrated to us the particulars of the instruments herein expressed, we are happy in the occasion of declaring our entire approbation of them.

WILLIAM BLIZARD.

THOMAS BLIZARD.

MY DEAR SIR,

I FEEL very sensibly the honour you have done me in submitting your valuable improvements in several chirurgical instruments to my inspection. To say that much mechanical ingenuity is exhibited in the contrivance of them, is the least of their praise; for they appear to me to

to constitute a most useful and important addition to our stock of instruments, by which many great operations may be performed with unusual safety and facility, and the hazard and suffering, subsequent to various accidents, may be remedied, or greatly diminished. Your portable case of amputating instruments, possesses so many evident advantages, that it ought to be regarded as an important benefit conferred on naval and military surgery.

I have the honour to be,

My dear Sir,

With great respect and esteem,

Your's, most faithfully,

JOHN PEARSON, F.R.S.

Surgeon of the Lock Hospital and Asylum, Consulting Surgeon of the Public Dispensary, &c. &c.

Golden-Square, Nov. 16, 1814.

To the Chevalier Assalini.

8, *Bucklersbury, Nov.* 6, 1814.

MY DEAR SIR,

I LEARN with regret that you are about quitting London; I shall ever entertain a lively recollection of your readiness to communicate your improvements of many practical points in surgery. Circumstances, which I could not controul, have unfortunately prevented me from profiting by this disposition to the fullest extent; nevertheless, I beg permission to express to you the pleasure I derived from all I had an opportunity of witnessing. Your Double Tenaculum

Tenaculum Forceps, for taking up arteries, is a manifest improvement—your Sound, will greatly facilitate the making of counter openings—your Retractor admits of being applied in an instant, and must effectually accomplish the purposes for which it is intended. Your contrivance for the management of fractures, which I had an opportunity of witnessing in use at St. George's Hospital, unites simplicity with the easy attainment of every indication. Perfect steadiness is given to the limb, all irregular pressure completely avoided; permanent extension and counter-extension, when required, are, in your contrivance, of easy execution; whilst the wounds, in compound fractures, can be readily dressed. I must leave to the accouchers the task of doing justice to the valuable additions you have made to their important branch of the profession. I sat down only with the intention of expressing my thanks to you, and wishing you a safe return to your native country; but I have been led away to speak of what we owe you. Excuse this digression, and believe me,

My dear Sir,

Ever your's,

GEORGE YOUNG.

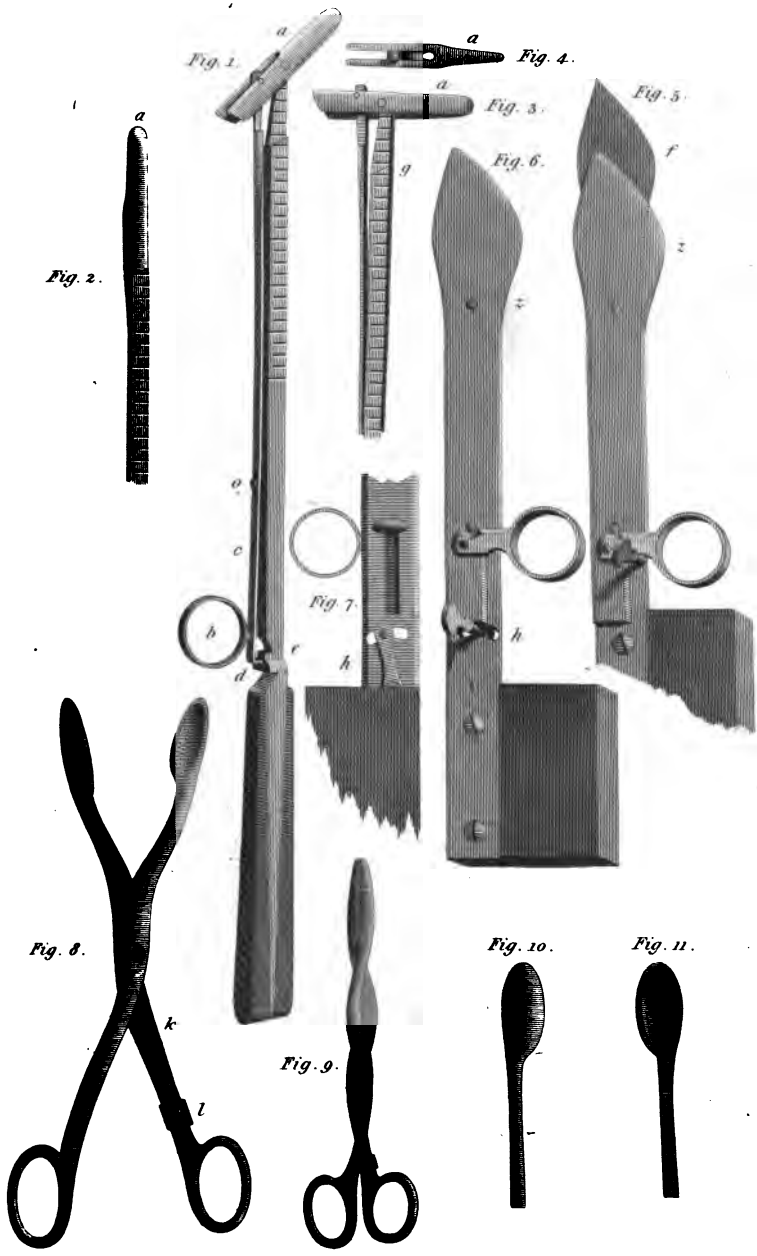
Chevalier Assalini.

Charlotte-Street, Nov. 12, 1814.

My Dear Sir,

I beg leave to thank you for the loan of your Manual of Surgery, which I have read with much attention. It appears to me to contain many valuable facts and observations, especially on *Hospital Gangrene—on the Treatment*

The Chevalier Afsalini's Instruments for
LITHOTOMY.



Drawn by C. Varley.

Engd by

ment of Fractures, which is particularly adapted for military practice, as the apparatus employed is simple, and can be easily procured in all climates, and in all situations—no trifling advantage in active service.

Your portable case of instruments contains more in a small compass than I ever saw, and some of the instruments are of a new construction (at least so far as I know) the double tenaculum in particular, I consider to be of great utility in military surgery, especially for operations in the field of battle.

Immediately after you had the goodness to leave your portable case of instruments with the Board, Mr. Stodart was directed to make a similar set, which are now making; and I believe it to be the intention of the Board to recommend several sets to be sent out to Canada, for the use of the surgeons in the field.

I have the honour to be, with much esteem,

Dear Sir,

Your's, very faithfully,

W. FRANKLIN.

Chevalier Assalini.

PROFESSOR ASSALINI having explained to me the apparatus invented by him for the treatment of fractures of the lower extremity, I have employed it in the case of a patient in St. George's Hospital, and I have great pleasure in stating, that I find it extremely useful, and to answer perfectly well the purpose for which it is intended.

B. C. BRODIE,

Assistant Surgeon of St. George's Hospital.

Sackville-Street, London, Nov. 16, 1814.

I HAVE

I HAVE seen the apparatus for fractures in use at St. George's Hospital, and am perfectly satisfied with its utility and effects, as well as with its very excellent and simple principle.

ROBERT KEATE,

Surgeon Extra to the Queen, and Surgeon of St. George's Hospital.

Albemarle-Street, Nov. 16, 1814.

SIR,

I HAVE examined the numerous instruments invented and improved by Professor Assalini, and have frequently conversed with him on their mode of application.

The apparatus for broken limbs is a well constructed compact fracture box, and appears well adapted to keep the limb perfectly steady.

The amputation instruments rest their merit on their portability, which to the military surgeon may be an object of much importance.

The Tenaculum is certainly much superior to the common one, and will be found a very useful instrument on many more occasions than taking up arteries; it embraces the smallest point, and from the form of the blades, directs the ligature to the exact spot required to be included. When applied to any given point, it remains steadily fixed, without any effort of the surgeon, however much the stump may be agitated by spasms, or the patient moved by the rolling of a ship.

The Double Forceps are well adapted to convey a ligature round the artery, without incurring any danger of including

ding the nerve; a circumstance of great moment, when efficient medical assistance cannot be obtained. They are also calculated to convey a ligature round a vessel, situated in a narrow deep wound, to the bottom of which the fingers cannot reach.

The Compressor of Arteries, recommended in cases of aneurism, in lieu of the ligature, appears adequate to fulfil the end in view, but it requires more frequent trials to establish its superiority, particularly in the operation on the external iliac artery, where the pressure of a hard foreign body might be expected to produce inflammation of the peritoneum.

The Canula with the grooved needle is likely to prove useful in establishing counter openings in extensive suppurations.

The instrument for making an artificial pupil is superior to any I have seen, as it acts both as a cutting instrument to divide any adhesions, and as a pair of forceps to remove a portion of the iris. I would, however, venture to suggest as an improvement, that the straight fixed blade should be with the cutting edge, and the shorter moveable blade should be the guard, or, in other words, that they should be exactly reversed from their present arrangement. In this form I conceive it would be much more manageable than it is at present, as the short projecting handle passes against the edge of the orbit, and there is no room for the fingers to act in opening the forceps. By changing the order of the blades, the projecting handle would be towards the operator, and would be more easily depressed with the thumb. There would also be an advantage in thus having the sharp instrument, with which the iris is to be perforated quite firm, and continuous with the handle.

The

The Attractor Vesicæ, though not necessary in young subjects, may facilitate and render less hazardous the operation for the stone, in cases where, from the accumulation of fat, there is much depth in the perineum.

The Double Gorget appears complicated, and difficult to manage, and does not offer any benefit to outweigh these objections, as there can be no necessity for retaining it in the bladder, and consequently no need of a sheath to cover the cutting edge, the staff being quite sufficient as a director for the forceps.

The Stone Forceps are decidedly much superior to those in common use. Their peculiar form admits of a considerable extention of the blades within the bladder, with scarce any expansion of the handles in the tract of the wound, which enables the operator to pass a second pair, to ascertain, by the graduated scale on the handles, the exact dimensions of the stone, and thus embrace it in the direction most favourable for extraction.

On a careful consideration of the various contrivances brought forward by the Professor, and from frequent conversations with him, I am of opinion, that he possesses great promptitude and discrimination, in detecting the sources of difficulties in operations, and a most happy facility in the construction of means to obviate them in future.

I feel happy in offering this feeble testimony in praise of his merits, and think that he richly deserves every encouragement from the Society of Arts, &c.

I am, most truly your's,

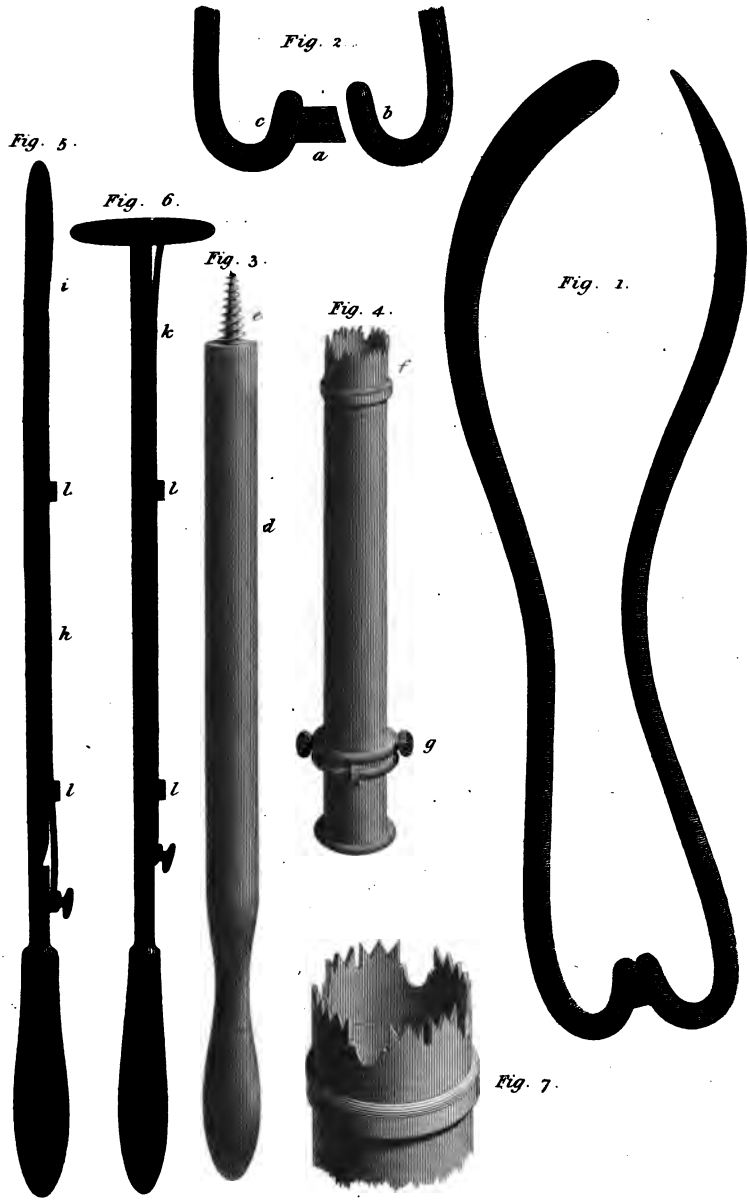
HENRY EARL.

Berner's-Street, Nov. 5, 1814.

To C. TAYLOR, M.D. SEC.

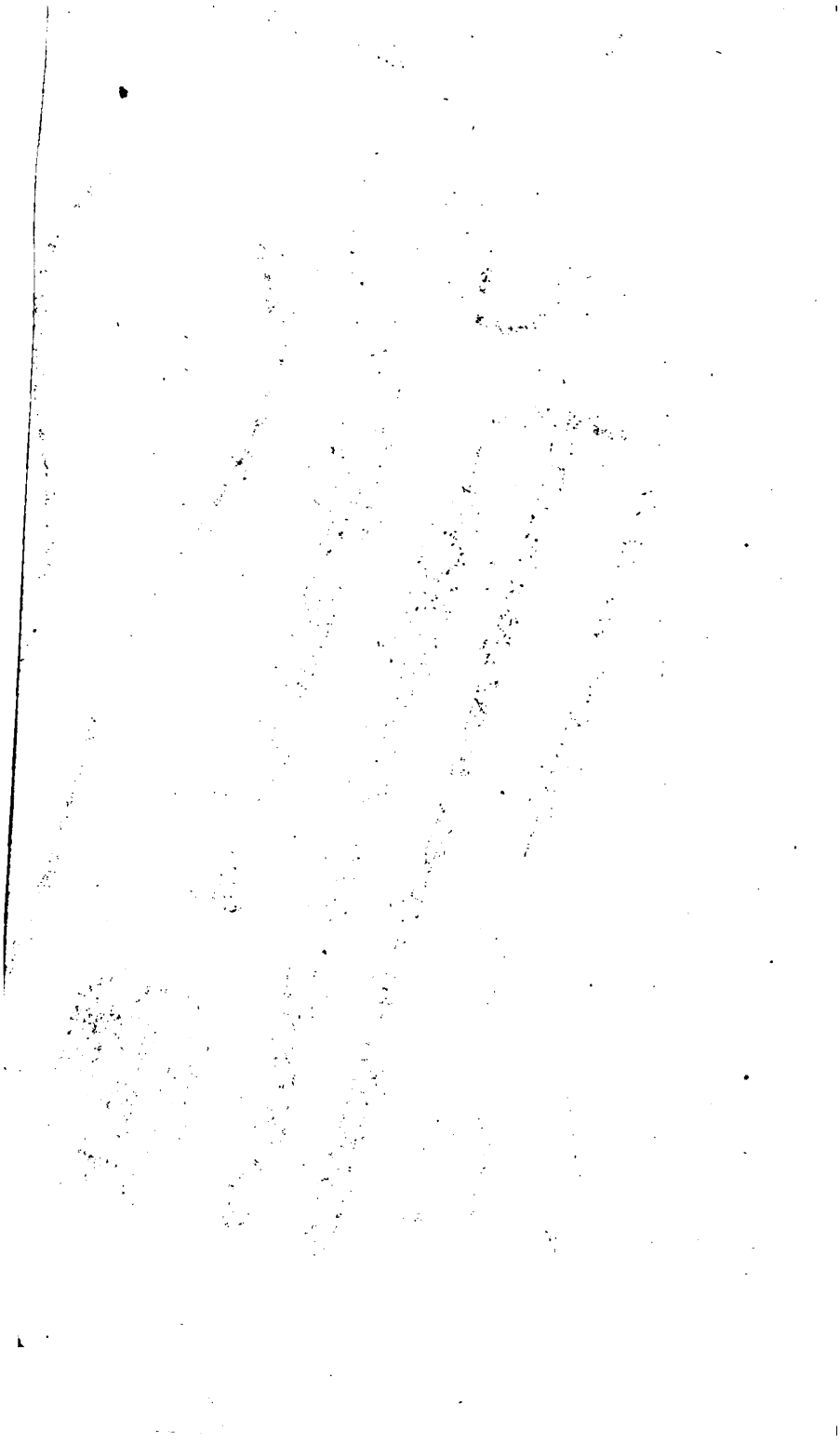
CERTIFICATES

The Chevalier Ajsalini's Obstetrical Instruments.



Drawn by C. Varley.

Engd by J. B. Taylor.



CERTIFICATES were also received from,

Dr. GEORGE PEARSON, George-Street, Hanover-Square.

Dr. ROBERT GOOD, Senior Physician to the Westminster Lying-in Hospital and Lecturer in Midwifery at St. Bartholomew's Hospital.

Dr. SAMUEL MERRIMAN, Physician Accoucheur to the Middlesex Hospital, and Westminster General Dispensary.

Mr. CHARLES MANSFIELD CLARKE, of Saville-Row.

Mr. ROBERT WATT, of Glasgow.

Mr. J. BRIGGS, Edgeware-Road.

Mr. BLAIR.

Mr. WANT; and other Medical and Surgical Gentlemen.

Reference to the Engravings of the Chevalier ASSALINI'S *Surgical Instruments. Pls.* 7, 8, 9, 10.

Instruments for Lithotomy, or Extraction of the Stone from the Bladder. Pl. 7. *Fig.* 1 *to* 11.

Figs. 1, 2, 3, 4, shew different views of the straight staff, with a moveable extremity *a*. Fig. 1, is a whole-length view of the instrument, with its extremity *a* in an inclined position. By means of the ring *b* on the sliding spring *c*, confined by the screw *o*, this extremity can either be placed in a straight line with the staff, as shewn in fig. 2, or in a transverse direction, as in fig. 3, and retained in the first situation by hooking into the notch *d*, and in the transverse situation in the notch *c*.

Fig.

Fig. 4, shows the moveable extremity as detached from the instrument.

This instrument is introduced in a straight direction along the groove of the common staff used in lithotomy, through the incision made in the perineum, until it enters the bladder; the common staff is then withdrawn, and the spring of the straight one pushed forward by the fore-finger through the ring *b*, which occasions the extremity to assume the transverse direction, as shewn in fig. 3, carrying a cross lever on the staff, with which the bladder is to be drawn toward the perineum, and the distance from the interior of the bladder to the exterior wound, is ascertained by observing the graduated scale on the outside of the instrument.

The gorget, fig. 5, is now to be introduced, by sliding it along the groove in the straight staff, shewn in fig. 3, at *g*. This gorget is made without any beak, with one broad cutting edge *f*, the opposite side of which is blunt, and adapted to the groove in the staff, fig. 3. The cross piece, fig. 4, at the extremity of the staff, prevents all possibility of the gorget being thrust too deep. When the section of the neck of the bladder has been accomplished, the sheath *z*, which is closely fitted on the surface of the gorget, is pushed forward to cover the cutting edge, as shewn in fig. 6; this is prevented from receding by a small sliding stop *h*, fig. 7. The straight staff is now to be withdrawn, and the forceps, fig. 8, introduced on the surface of the gorget. The peculiar curve which is given to the forceps, admits of the expansion of the blades within the bladder, with scarcely any extension in the tract of the wound; and the graduated scale *k* on the handles, enables the surgeon to know with certainty the exact dimensions of the stone to be extracted. The form of the

the forceps permits a second pair, fig. 9, considerably smaller, to be passed upon them to the stone, which also ascertain, by a graduated scale, the dimensions of the stone, in the opposite direction, and thus enable the operator to extract the stone in its smallest diameter. A sliding stop at *l*, fig. 8, prevents the stone from being crushed by too great pressure of the blades in its extraction. Figs. 10 and 11, shew the internal and external structure of the extremities of the forceps, which have a considerable resemblance to a duck's beak.

The forceps may be introduced along the staff instead of the gorget.

Reference to the Chevalier ASSALINI'S *Obstetrical Instrument. Pl.* 8. *Figs.* 1 *to* 7.

Fig. 1, shews the forceps, made with flat blades, without any hollow, and connected at the extremity of the handles by a small wedge, shewn at *a*, fig. 2, which passes from one to the other, entering a groove, shewn by the dotted lines at *b*, fig. 2, and holds the blades firm together. The blades do not cross each other, and therefore there is no risk of compressing the head improperly in extracting the child. The wedge *a* is retained in one of the handles, by a small screw *c*.

The instruments for extracting the head of a dead child consist in a solid cylinder of wood *d*, fig. 3, terminating in a sharp-pointed screw *e*, about six lines in length, the worm of which is sharp; the screw to be introduced along the finger of the accoucheur, and screwed into the bone of the cranium of the child, where it is firmly fixed. Over

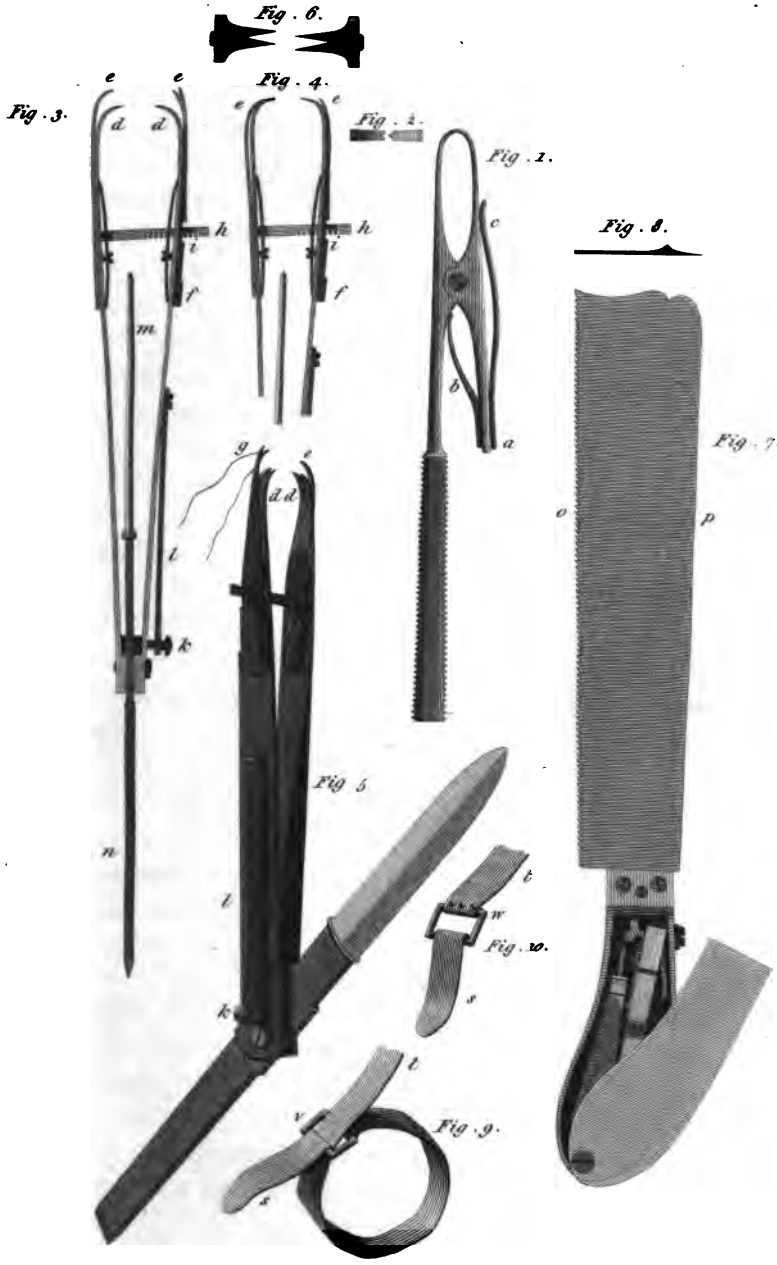
this solid cylinder, a tube, fig. 4, is next passed, at the extremity of which, a trephine *f* is fixed. This trephine acts by turning it backwards and forwards, upon the end of the solid cylinder, by the handle or studded ring *g*, and a circular portion of bone is thus cut through, which is removed by withdrawing the solid cylinder. After this, the long staff *h*, fig. 5, with a moveable extremity *i*, similar in principle to that used in lithotomy, is to be introduced through the hollow cylinder f, fig. 4, into the cranium; and the extremity, moved transversely, by means of the spring which runs through the loops 11, as shewn at *k*, fig. 6. This staff is to be moved in different directions, till the texture of the brain is destroyed. The cross lever k may be afterwards used to draw out the head of the child. Fig. 7, is an enlarged view of the head of the trephine.

The blades of the forceps are to be introduced separately, and when one is placed on each side of the child's head, the handles are connected by the wedge, and a firm grasp allowed to the hand of the operator.

Reference to the Engraving of the Chevalier ASSALINI'S *Amputating Instruments. Pl.* 9. *Figs.* 1 *to* 10.

Fig. 1, shews the double tenaculum, which consists of a small pair of forceps, the blades of which are separate, but converge at the points. One blade terminates in a single point; the other has two points at its extremity, as shewn more distinctly at fig. 2; the single point falls within the double points, so as to secure the smallest artery. By pressing with the thumb on the part *a*, which forces

The Chevalier Ajsalinis amputating Instruments.



Drawn by C. Varley.

Engraved by J.B. Taylor

forces down the inner spring *b*, the blades are opened to take hold of the artery. On taking off the pressure of the thumb, these points unite, and hold the vessel firmly without any effort on the part of the surgeon. The converging extremities of the blades direct the ligature to the exact part where the vessel should be tied; and the ligature, by means of this instrument, can be effected without an assistant. The spring *c* retains the ligature thread, previous to its application.

Figs. 3, 4, 5, 6, represent a double pair of forceps, for tying an artery without incurring the risk of including the nerve, whilst the ligature is making; they consist in a pair of dissecting forceps, forked at their extremities *dddd*, figs. 3 and 5. On the outside of each blade, a smaller one ee, ee, ee, figs. 3, 4, 5, are closely fitted, and made to slide up and down by a stud *f*, so as to project beyond the points of the former blades. One of these blades has a groove at the extremity, in which the ligature thread is placed, as shewn at *g*, fig. 5. The two external blades are connected by a small bar *h*, notched on one side to receive the upper blade at *i*, when pressed forwards by the stud *f*, and thus keep the forceps fixed, without any effort of the surgeon.

The converging form of the blades directs the thread to the exact spot, where the ligature should be made.

The extreme points of the blades are shewn more distinctly in an enlarged view of them, at fig. 6.

This instrument contains also a sheathed catlin, or small double-edged knife, and a file with a screw-driver at its end, which are retained firm in their position by a pin k, fig. 5, fixed in the spring *l*, and which pin goes into a hole in each blade. In fig. 3, the catlin is shewn in the body of the instrument at *m*, and the rasp *n* ex-

tended lengthways, so as to form a handle for the instrument. In fig. 5, the catlin and rasp are shewn, in an inclined position. When the catlin is used, the rasp is in the body of the instrument, and the body of the instrument forms the handle for the operator, which is also the case when the rasp or screw-driver are to be used, and the catlin returned to its place.

Fig. 7, represents the portable amputating instruments used in the French army. A steel well-tempered blade, about two inches broad, and nine inches long, is formed on one edge into a saw o, and on the other into a knife p; this knife edge is made like a razor, for the greater facility of being sharpened. Within the handle of this instrument, which is shewn half open at *r*, are contained all the other instruments requisite in the field of battle; as a catlin, a tenaculum, forceps—all made to fit one handle; besides needles, ligature, thread, &c.

Fig. 8, shews a section of the blade and the razor-edge of the knife.

Figs. 9 and 10, represent a simple band tourniquet, in which the band, passing through a buckle, is retained firm on three upright fixed teeth. The short strap *s*, fixed on one side of the buckle, holds it firm, whilst the long strap *t*, passing through the buckle *v*, and pulled close, is attached to the teeth *w*, and firmly secured.

Reference to various detached Instruments of the Chevalier ASSALINI'S. *Pl.* 10. *Fig.* 1 *to* 11.

Fig. 1, shews the wooden case for fractured legs, extending from the middle of the thigh to some distance below

below the foot; this is hollowed out to the form of the limb. A vacancy is left under the ham at *a*, and at the calf *b*. The lower end at *c* is excavated to the extent of several inches, to admit of the application of the foot-board *d*, which moves upon an iron pin *e* running through it. Holes are made at different distances, to allow of the apparatus fitting limbs of different lengths. The foot-board *d* is secured in a proper position on this pin by means of two linen bands, one of which passes round the upper part of the board, and is fixed to the slits *f f* on the sides of the case, about half way down the leg; the other band passes in the opposite direction of the foot-board, to the slits *g g*, below the foot-board, and is there secured: retaining the foot-board in a fixed position. The foot-board is notched at the sides, to prevent the descent of these bands; *h h* are leather straps, for confining the limb in a proper situation, by means of the pins *i i*, on the sides of the case.

Fig. 2, represents the arterial compressor, which consists of a pair of forceps, not crossing each other, but turning on a centre k. The extremity of the blades is for about 1-8th of an inch broader and flatter than the upper part, as seen at b. Below this the blades are narrower, in close contact, and bevelled off at each side at an angle of about 45 degrees, forming an edge sufficiently sharp, as seen at the section, fig 3, to cover the division of the internal coat of the artery, when the blades are forcibly compressed by the screw *m*, which passes through the handles. In using the instrument, the screw *m* is only used to accomplish this division of the internal coat; it is then unscrewed, and the permanent compression left to the weak spring *n*, between the handles, which is sufficiently powerful to

arrest the current of blood, without causing ulceration of the external tunic.

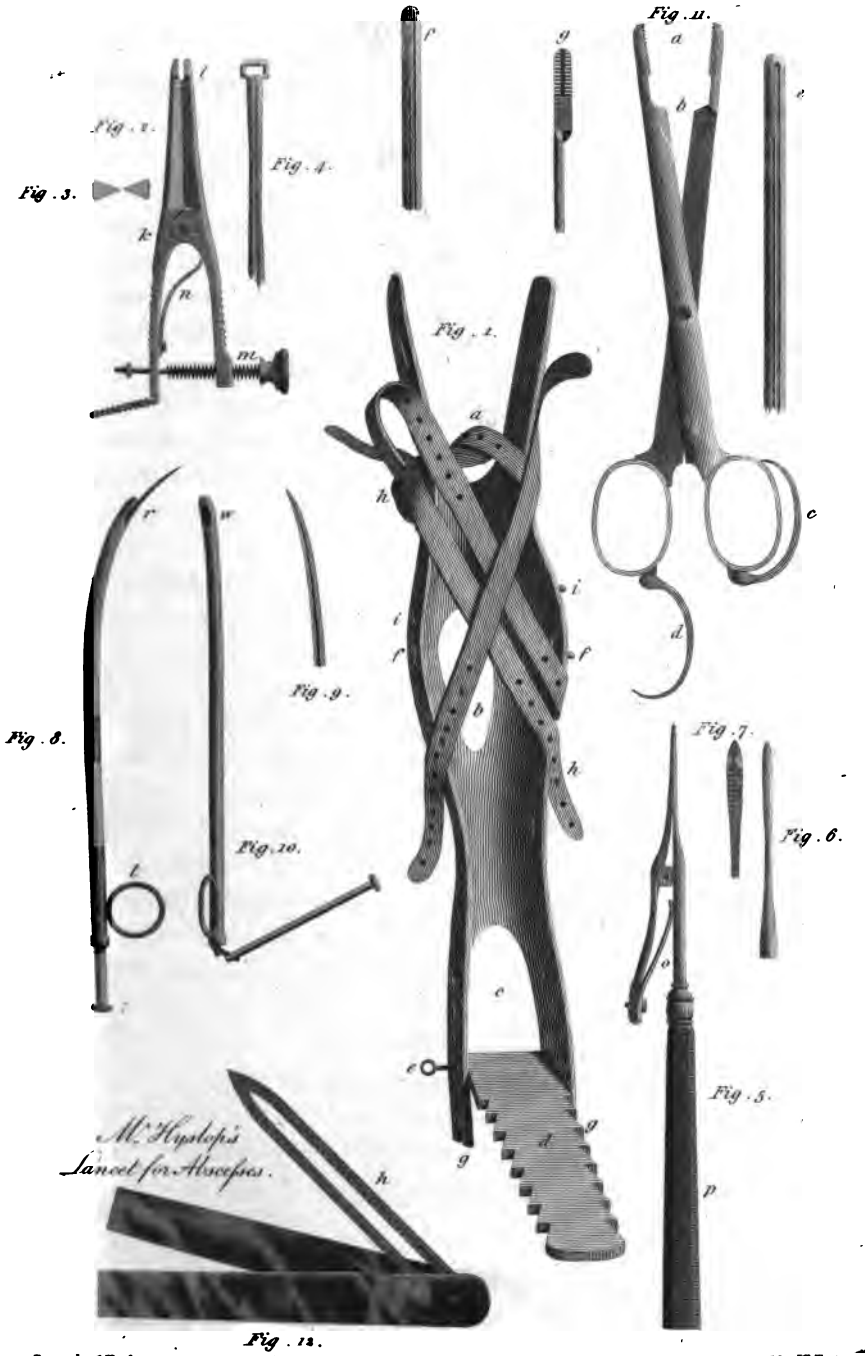
Fig. 4, is an external view of one of the blades.

Fig. 5, is a representation of the instrument for making an arificial pupil to the eye. It consists of a pair of small forceps, the blades of which are very flat, and closely adapted to each other. One blade, fig. 6, has a sharp cutting edge, and is rather spear-shaped; the other, fig. 7, is blunt, and somewhat broader than the cutting blade, so as to cover it, and prevent it from acting as a sharp instrument, when the two are in close contact. A small spring *o* between the handles retains the blades shut, except when the handles are pressed by the operator. A wooden handle *p* is attached to one side of the forceps. When the instrument is to be used, an opening is to be previously made into the transparent cornea, through which the closed forceps are introduced, with the cutting blade towards the iris. If the pupil is quite closed, the blades are to be slightly opened, and the spear-shaped one passed through the iris near the centre, and carried forward until it reaches the ciliary processes. The blades are now to be closed, and the portion of the iris contained between them is to be quietly drawn out at the opening in the cornea, and then detached with a common lancet or scissors.

When the iris is simply adherent to the capsule of the lens, and the pupil not imperforate, the cutting edge may be employed in freeing any such adhesions. It may likewise be used for removing the adherent opaque portions of capsule, which often remain after operations for the cataract.

Fig. 6, is an instrument for making counter openings in sinusses, or deep wounds; it consists of a silver tube, resembling

The Chevalier Assalini's various detached Instruments.



Drawn by C. Varley.

Engraved by J.B. Le

sembling a female catheter, containing a long spring needle, the pointed part of which is shewn, with its groove, at fig. 9, and a small part thereof projecting from an orifice in the tube at *r*, fig. 8. The sound, containing the covered needle, being introduced into the sinus, and reaching the bottom of it, the point of the needle is then forced outwardly through the skin, by pressing on the head of the needle at *s*, whilst the tube is held by a finger through the ring *t*. When the needle appears through the skin, the groove in its point acts as a director for a scalpel, to enlarge the opening. The handle of the needle is made with a joint, shewn at *v*, fig. 10. This joint answers the double purpose of comprising the instrument in a less space when not in use, and of preventing the point of the needle being protruded through the opening *w*, until the puncture is to be made.

Fig. 11, is a combination of various instruments in one, with a view to portability. It is here shewn open, and displays a pair of forceps at A, a pair of scissors at B, a tenaculum at C, and a needle at D. The backs of each blade serve as directors, one of which shewn separate, has a stop at the end, at E, to prevent the scalpel from cutting farther; the other F, has no stop. The inner part of one of the ends of the forceps is shewn at G; it has a small longitudinal groove in the centre, and teeth cut across to make it hold firmer.

The SILVER MEDAL *was this Session voted to* JOHN HYSLOP, *Esq. of Fenchurch-Street, for an improved Lancet for opening deep-seated Abscesses. The following Communication was received from him, an explanatory Engraving is annexed, and the Instrument is preserved in the Society's Repository.*

SIR,

I BEG leave to lay before the Society of Arts, &c. a lancet of my invention, for opening deep-seated abscesses, and I herewith send one for their inspection. The advantages arising from it are several: 1st, the instant the lancet reaches the pas or fluid contained in the abscess, it will be known from the matter freely flowing out through the opening in the blade. This prevents the necessity of a second or third puncture, which often alarms the patient, occasions extra pain, and agitates the surgeon.

The common lancet being wedge-shaped, plugs up the opening, as it passes in making the puncture, and thus no fluid can escape until it is withdrawn; therefore if the surgeon has not been fortunate enough to push the blade as deep as the fluid, a subsequent puncture must be made.

2dly. If it is necessary to pass a probe, this can easily be done, if my instrument is used; or if it be adviseable to dilate the aperture, a bistory can be passed for that purpose into the opening of the blade.

3dly. Another advantage attends my instrument, which is, that the blade remaining in the opening while the fluid passes through the aperture; its discharge is not stopped

or

or checked by the intervention of any tendon or fascia, which frequently occurs in the use of the common lancet, and which it is of consequence to prevent.

This instrument has been repeatedly tried, and always found to answer well; and there is no doubt of its diminishing the pain usually experienced in the opening of abscesses.

I remain, Sir,

Your obedient servant,

JOHN HYSLOP.

Fenchurch Street, Dec. 13, 1814.

To C. TAYLOR, M. D. SEC.

CERTIFICATES.

SIR,

I BEG leave to state, that I was present with you on Sunday the 12th instant, when you opened a very large abscess, which had formed under the lower angle of the scapula, beneath the dorsal muscle. It had been found, that the common abscess lancet would not pierce this muscle; and the patient, being timid, would not submit to an extensive incision through the integument, so as to expose the muscle, and get cautiously into the the abscess, without the risk of plunging the lancet into the lungs. The abscess was of very considerable size; the matter being in the beginning formed under the scapula, and dropped down, it could not well be known, by means of the common lancet, whether it had reached it, or whether the lancet (from the absence of discharge) had gone too far

far, and pierced the cavity of the chest. Your lancet, however, seems quite to answer the purpose, and remove all fears; for by its strength, it pierced the strong muscle, and the opening in the blade of the lancet allowed the discharge of the matter. We could see that it had gone sufficiently deep, and *not too far*.

Besides this, through the said opening we could introduce a small probe, so that the orifice of the skin, and the orifice of the muscle, could be kept in contact, and so managed, as to allow the free discharge of the matter, which was thus all evacuated. I never before saw such a lancet as your's, and I think it an ingenious and useful improvement.

I remain, Dear Sir,

Your's sincerely,

JOHN MITCHELL, M. D.

To John Hyslop, Esq. 60, Fenchurch-Street.

THIS is to certify, that I think the invention of Mr. Hyslop is highly ingenious; that such an instrument was much required, and cannot fail to be useful.

ASTLEY COOPER.

New Broad-Street, April 5, 1815.

Reference to the Engraving of Mr. HYSLOP'S *Lancet for opening deep-seated Abscesses. Pl. 10. Fig. 12.*

The principal difference between this and the common lancet depends upon the longitudinal opening H made in the

the blade. When the lancet penetrates the abscess, the pus or matter contained therein, immediately flows out through the aperture, and prevents a repetition of the puncture, frequently required with the common lancet.

The SILVER MEDAL *and* FIFTEEN GUINEAS *were this Session voted to Mr.* RICHARD WILLIAM FRANKLIN, *No 3, Stracey-street, New Compton-street, for a Lifting and Forcing Pump, or Double Piston Pump, to raise Water. The following Communication was received from him, an explanatory Engraving is annexed, and a Model of the Pump is preserved in the Society's Repository.*

SIR,

I BEG leave to submit to the inspection of the Society of Arts, &c. my new invented double lift pump, in one barrel, and with one handle or lever.

This pump is very simple, of easy construction, and throws a double quantity of water, with the usual labour, and can be made at very little more expence, that a common pump.

This pump consists of one barrel, in which two pistons work, each furnished with a double valve. The two piston rods are connected to the handle at opposite sides of the axis, so that as one piston ascends, the other descends, keeping up a continual stream.

The

The common lifting pump is well known; but mine is an improvement upon it, and will convey the water to the cistern at the top of a house, to serve all the dressing rooms, water closets, &c. in the house.

It appeared to me that such an instrument would be useful to thousands, and likewise merit the sanction and approbation of the Society of Arts.

Many attempts have been made, to make pumps to answer a similar purpose, and I have a thorough knowledge of them all by experience, as a workman.

De la Hires lifting and forcing pump, is too complicated, and too dear, and no common pump, that works with two handles, is worth any thing.

I am, Sir,

Your humble servant,

RICHARD WILLIAM FRANKLIN.

Stracey-Street, St. Giles's,
March 29, 1815.

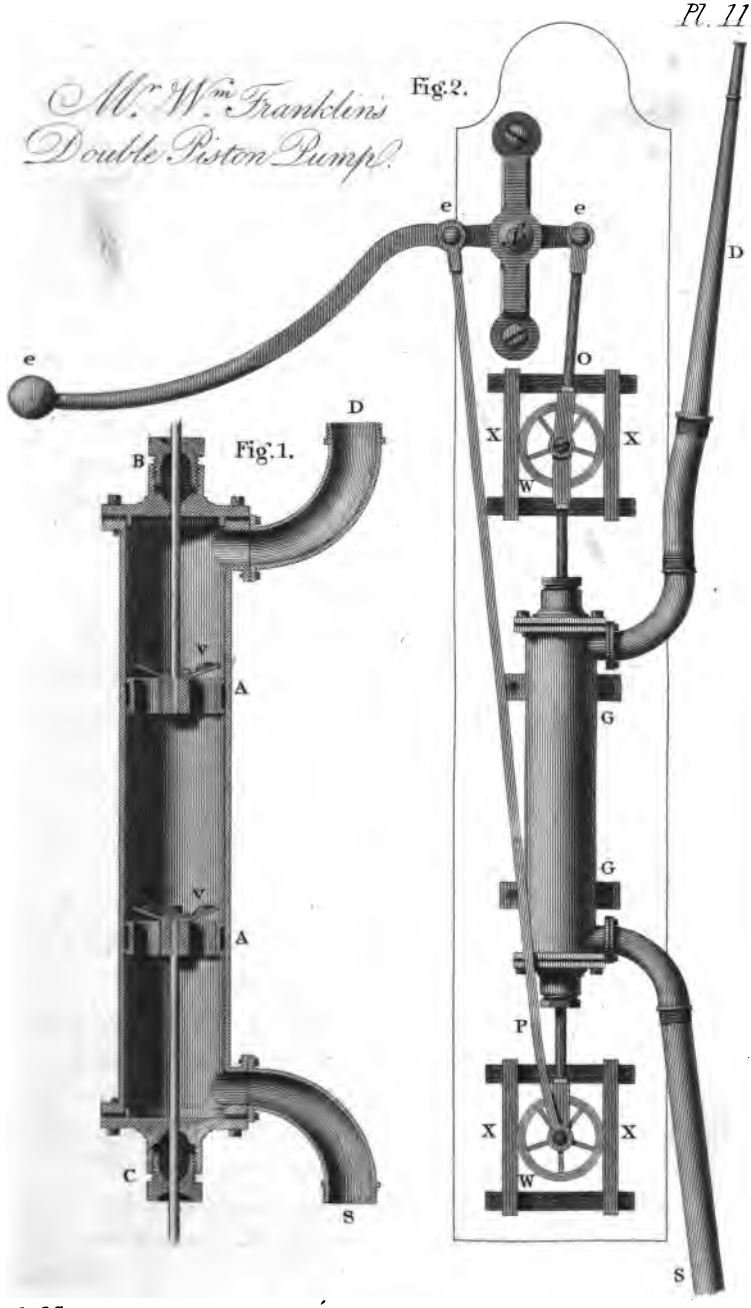
To C. TAYLOR, M.D. SEC.

Reference to the Engraving of Mr. WILLIAM FRANKLIN'S *Double Piston Pump. Pl.* 11. *Figs.* 1 *and* 2.

Fig. 1, is a section of the pump. A. A. are two pistons, on the upper face of each is a double valve, v v v v; the upper piston rod passes through the stuffing-box B, and the lower through the stuffing-box C. S is the suction pipe, and D the discharging pipe.

Fig. 2, is an external view of the pump; e e e the lever or handle; F the fulcrum, on which the handle moves;

Mr. Wm. Franklin's Double Piston Pump.



Drawn by J. Clement

Engraved by James [illegible]

G G the pump cylinder; w w the wheels which revolve between the standards x x x x, and which conduct the piston rods parallel to the cylinder; e p the conducting rod which conveys the motion of the handle to the lower piston; e o the conducting rod, which gives motion to the upper piston. It is evident, when the handle or lever is lifted, that the upper piston is pressed down, and the lower piston is at the same time elevated, with its valves shut, which forces the water through the upper piston and the discharging pipe at the same operation. And when the handle is *pressed* down, the upper piston rises with its valves closed; and the water, in its ascension, is forced through the discharging pipe: at the same time, the lower piston descends, by which action its valves are opened, and introduces a supply of water equal to the contents of the cylinder, minus the capacity of both pistons. The peculiar advantages of this pump, with double pistons, are, that with a six-inch stroke it discharges a quantity of water equal to twelve inches of the cylinder; and so, in this proportion, by always doubling the quantity of the stroke, whatever it may be; and thus furnishing a product just equal to two common pumps of the same stroke and capacity of cylinder, and certainly with less than a proportionable friction and expence.

TWENTY GUINEAS *were this Session voted to Mr.* ALEXANDER LAW, *of Deal, for his Improved Telegraph, or Method of conveying Intelligence to and from Sea and Land. The following Communication was received from him, an explanatory Engraving is annexed, and a Model of the Apparatus, with a Key to the Signals, is preserved in the Society's Repository.*

SIR,

I BEG you will be pleased to lay before the Society of Arts, &c. for their Inspection, a model of a semaphoric telegraph, of my invention. In consequence of hurts received, I have been discharged from His Majesty's Ship Monmouth, of which I was a midshipman. In the two last wars, my father and three brothers younger than myself, have fallen in the service of their country.

The certificates of good conduct which I can produce for a period of twenty-one years, would have enabled me to pass an examination, and look forward to the provision which is intended to be made for that class of petty officers, but unfortunately the hurts I received prevented me entering into active service afloat. It was during this time, that I have been constantly endeavouring to bring the telegraph to perfection, having had the charge of the signal duty at the Port-Admiral's Office, at Deal, for the last seven years.

I beg leave to state, that if the Society pleases, I will attend personally with the key of my telegraph and its explanation. I have the honour to be, Sir,

Your obedient humble servant,

ALEXANDER LAW.

London, Dec. 9, 1814.

To C. TAYLOR, M.D. SEC.

CERTIFICATES.

CERTIFICATES.

I HEREBY certify, that I have carefully examined the model of a semaphoric telegraph, presented to me by Mr. Alexander Law, Midshipman of H. M. S. Monmouth. I have witnessed the making and use of it, at my Office, at Deal, and I am of opinion, it will answer the service he proposes, and that it is likely to be of great public utility, and I believe it to be his own invention. He likewise suggested to me, an addition to the twelve-shutter telegraph, which caused an entire saving of bunting, and communicated signals more speedily and accurately.

Given under my hand this 7th day of December, 1814.

THOMAS FOLEY,
Vice-Admiral.

CERTIFICATES to a similar effect were produced from the following Officers:—

THOMAS BOYS, Post Captain of H. M. S. Zealous.

H. DOWNMAN, late of the Princess Caroline.

W. WILKINSON, late Captain of H. M. S. Monmouth.

JAMES HENRY GANELEY, Commander of H. M. sloop Parthian.

JAMES WEMYSS, Captain of H. M. S. Rainbow.

F. WELSTEAD, late Lieutenant of H. M. S. Monmouth.

ROBERT BOYLE, late Lieutenant of the Jason.

DAVID CREE, Lieutenant, late Superintendant of the Admiralty Telegraph at Deal.

Reference

Reference to the Engraving of Mr. LAWS' *Telegraph. Plate 12, fig. 1, 2, 3.*

FIG. 1 is supposed to be a fourth-rate top-mast, in length 54 feet, supported by four stays or shrouds a, a, a, a, in the usual manner, that a mast or flag-staff is secured on shore. The signals are given by four different lever-arms or signs b, c, d, e, they at present represent the signals, (see list of signals in the Society's Repository); the motion is given to the lever-arms by ropes, called topping-lifts; each arm having two and three rings, at proper distances on each, and to each ring is attached a brass-plate, with its number on it.

The arm b, represents a cross-arm or T; the arm c, a circular plate; the arm d, a straight bar; and the arm e, a spear head. These arms move on fulcrums at *f*, *f*. Fig. 2 represents the lever-arm c. singly, and moveable on a fulcrum at *f*, having its topping-lifts made fast to a ring, at the shortest end of the lever.

The cross trees g g g g. have two holes in the end of each, through which the topping-lifts are conducted; thereby affording an angular purchase to move the arm in any required direction: the other three arms are worked in the same way; h h represents the bottom part of the mast, with two hooks k, k, to pitch the rings 1, 2, 3, 4, 5, and 6, that are on the two topping lifts, according to the position in which it is required to place the arm when in use, and which correspond with the dotted positions, numbered as above.

Fig. 3, is a horizontal section, shewing the motion for turning the signal-post to any required direction: m, is the top-mast; n, is the head of the lower-mast: p, s, the two

two pullies that conduct the rope; r, is the roller; y, the winch; k, k, k, k, hooks for the rings to which they are attached when in action.

The mast is turned round by means of the winch and roller, the middle of the rope having four spiral turns round the roller; the ends pass up on each side of the mast, and the one passes through the cheek block at S; and, being wrapped or wound three or four turns round the lower part of the top-mast, descends through the opposite block at p; an eye being spliced on both ends of the rope, they are drawn tight, as occasion may require, by means of a lanyard rove through them, thus forming an endless rope, by which the top-mast and cross-trees are faced to any direction, and secured there by means of a click and ratchet-wheel, on one end of the roller.

*** It appeared on examination by the Committee of the Society, that a Telegraph on this construction would save one hundred and sixty yards of bunting, or cloth used in the present signals, and give the signals more distinctly.

That one arm, on this construction, has been employed at the Signal House at Deal, by Mr. Law, which answered perfectly; which arm, though four and a half feet long, and placed twenty-five feet high, was worked with ease and dispatch; and that the same plan could easily be used on the flag-staff or mast of a ship, without being impeded by the wind or sails.

Mr. Law has also a Night Telegraph on a similar principle, and which answered on trial at the distance of a mile and a half.

The SILVER MEDAL *was this Session voted to Mr.* ALEXANDER LAW, *of Deal, for his Method of securing Ships' Guns and Carriages. The following Communication was received from him, an explanatory Engraving is annexed, and a Model of the Apparatus preserved in the Society's Repository.*

SIR,

I BEG leave to lay before the Society a model of a method of securing ships' guns and carriages, by means of my right and left-handed screw, lever, and hook nuts. This invention will enable one man to perform the duty of seven, and in one-third part of the time secure the gun for sea-service. It possesses the advantage of great safety where new breechings are used, which require to be tightened or re-secured at sea, in the event of being taken by a gale of wind. In such a case one man can with ease tighten and secure all the guns on the lower deck without danger, by taking one or two turns with the lever of the screws; whereas in the common span lashing, you must take all but two turns off before you can again span the breeching in; and, in general, when the lower deck guns are in want of fresh securing, all the men quartered at those guns are necessary at that time; and, it is further evident, that a single man to each gun, with my apparatus, will re-secure them in less time than all the men that are quartered, on the present system. I flatter myself this invention will meet with the approbation of the Society; and I remain,

Sir,

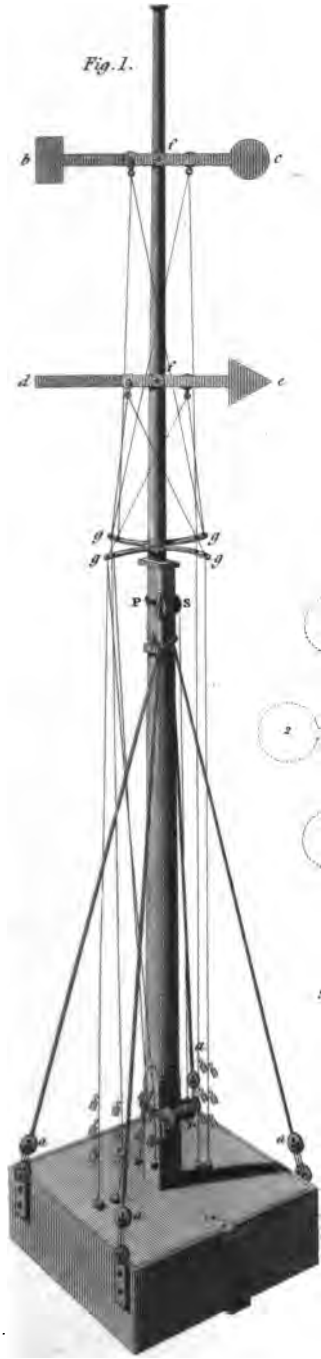
Your obedient servant,

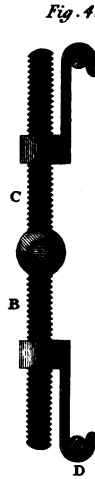
ALEXANDER LAW.

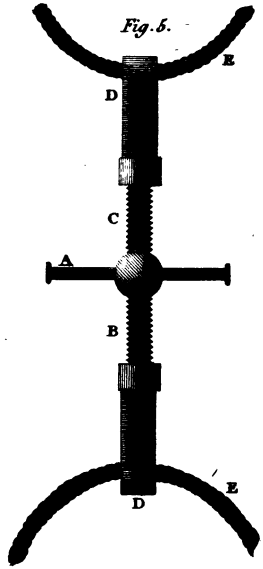
To C. TAYLOR, M.D. SEC.

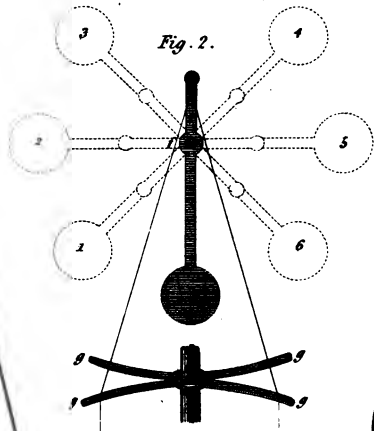
Mr. A. Law's,
Telegraph.

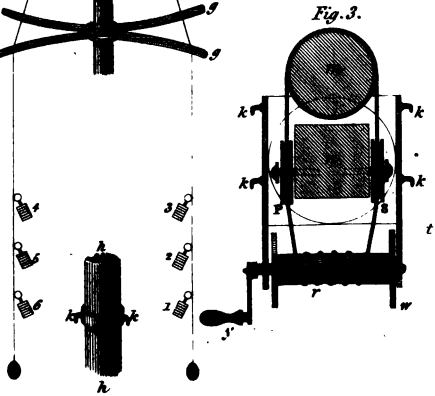
Mr. A. Law's, Screw
for securing Gun Carriage.











CERTIFICATES.

CERTIFICATES in favour of Mr. LAW's method of securing ships' guns and carriages were received from the following Naval Officers, viz. ADMIRAL FOLEY, CAPTAIN BOYS, CAPTAIN DOWNMAN, CAPTAIN WILKINSON, CAPTAIN GANELY, CAPTAIN WEMYSS, LIEUT. WELSTEAD, LIEUT. BOYLE, and LIEUT. CREE.

Reference to the Engraving of Mr. LAW's *Screw for securing Gun Carriages. Plate* 12, *Figs.* 4 *and* 5.

FIG. 4 and fig. 5, represent Mr. LAW's plan of lashing gun carriages, &c. by means of an apparatus, with a right and left-handed screw. A the lever; B, B, the left-handed screw; C, C, the right-handed screw; D, D, D, D, hooks for laying hold of the ropes. The act of turning the screws by the lever A, one way, extends the hooks from the ball or head of the screws, and slackens the ropes; and, by turning them the contrary way, the hooks move towards the head or fall of the screws, and thereby render the ropes tight.

The SILVER MEDAL *and* TEN GUINEAS *were this Session voted to Mr.* J. BUCK, *of Fort-Place, Bermondsey, for an Instrument to examine the State of Ships' Bottoms whilst at Sea, or to discover Articles sunk in Water. The following Communication was received from him, an explanatory Engraving is annexed, and a Model of the Instrument is preserved in the Society's Repository.*

SIR,

HEREWITH you will receive the model of an apparatus for examining the bottoms of ships whilst at sea. Having been upwards of seven years in the Navy, I have often experienced the want of such an instrument, and during a voyage from Bengal to Madras in His Majesty's Ship Macassar, commanded by Captain Wilbraham, in cruising off the Land Heads, the ship struck, and rode across a rock for six hours, and after getting her off, the Captain was doubtful whether the ship's bottom was injured or not. I then asked leave to try an experiment for ascertaining the fact; which being granted, I made an instrument on a similar plan to the model I have sent you, by the aid of which we discovered that the ship's bottom was materially injured. We therefore put back again to Bengal, where she was broken up.

If this discovery had not been made, the ship would have been in a most dangerous predicament.

The usual mode to ascertain any damage which a ship may be supposed to receive at sea, is to make to the near-

est

est port, where she is hove down or laid on her side, to be examined, which takes up a considerable time, as the guns must be shifted, and it is often found necessary to put the cargo on shore.

I have lately repeated here the experiment of my instrument in the presence of a Member of the Society of Arts, &c. and it was tried in the Thames, near London Bridge, where, though the water was very thick, the experiment was found to answer completely.

This invention will not only be found useful for the above purpose, but may be advantageously employed for discovering bodies or any thing valuable that may have fallen into any water where their situation is nearly known.

By the recommendation of several friends, I am induced to make the invention public through the medium of the Society of Arts, if they should think it deserving of their notice,

I am, Sir,

Your humble servant,

J. BUCK.

Bermondsey, February 2d, 1815.

To C. TAYLOR, M.D. SEC.

THE Society being desirous to ascertain accurately the merits of Mr. Buck's invention, a Committee was appointed to meet at the London Docks, to make there an experiment of Mr. Buck's apparatus.

By the assistance of Captain Walton, Dock Master, who obligingly accommodated them with the Launch,

and also politely attended them with other boats, manned for the purpose; and Mr. Buck, the Claimant, having provided himself with an instrument ten feet long, and six inches diameter, made of tinned iron plates painted, containing an oval object-glass, about ¼ inch thick; the Committee proceeded to examine the bottom of a vessel named the Tiger; and notwithstanding the day was cloudy, and the water in the Docks very much discoloured, so that objects to the naked eye were visible but at a very small depth below the surface, yet by means of Mr. Buck's instrument, they were able to examine the planks and seams very distinctly to the depth of full seven feet below the surface of the water. It being suggested that the nails and sheathing of a copper-bottomed vessel would present a much better opportunity of proving the merits of the invention, the Committee proceeded to the Golden Grove ship; and, under similar circumstances as before, they clearly discovered the fastenings, &c. at a depth of between 8 and 9 feet: but on the sun breaking out, the effect was much improved, and it appeared to them that there was no doubt that a leak, or any other injury, might, under such circumstances, be discovered with great ease; and they were fully of opinion that the invention is well calculated to answer the intended purpose.

Reference to the Engraving of Mr. BUCK's *Instrument for examining Ships' Bottoms. Pl.* 13.—*Fig.* 1, 2.

Below the ship, fig. 1, a, b, a tin tube, 9 inches diameter is shown, the length to suit the ship's draught in the water. This is suspended from the ship's side by a rope, fastened

fastened to a ring in the middle: the bottom b is closed by a strong plate glass, placed obliquely to prevent the light of one tube being reflected from the glass up the other, so as to bend the rays in their passage from the water to the air, thereby giving a more direct view of the bottom than could otherwise be obtained: rising from the same base is a tube d, lessening to the top e, and as close to the large tube as the observer's head will allow. The observer, in a boat, looks into this small tube, and sees part of the ship's bottom which receives light down the large tube. A weight, c, is hung near the bottom to sink the tubes.

Fig. 2 shows the tubes upon a larger scale; the end, b, is enlarged by a rim to fasten the plate glass in water tight, without lessening the aperture; the ring, to which the suspending line is to be attached, is shown about the middle of the larger tube.

The SILVER MEDAL *was this Session voted to Mr.* RICHARD WILLIAMS, *of His Majesty's Dock Yard, Chatham, for his method of removing the Centres of Brick or Stone Arches, without risque to the workmen. The following communication was received from him, an explanatory Engraving is annexed, and a Model of the Apparatus is preserved in the Society's Repository.*

DEAR SIR,

THE bearer hereof, Mr. Richard Williams, is the inventor of a contrivance for easing at the same moment a centre of *any length*, particularly useful in tunnels, or other long arches; and it has been practised with success upon some of the ordnance works of this place, as the cer-

tificate of Colonel D'Arcy, the Commanding Engineer, specifies. The man, who is a carpenter, will bring with him a model of the apparatus, which he begs leave to submit to the Society for consideration, and if the Society should think it worthy of their attention and patronage, he will be proud of the honour.

Believe me, dear Sir,

Your obliged and humble servant,

H. T. ELLICOMBE.

His Majesty's Dock Yard, Chatham, April 11th, 1815.

CERTIFICATE.

THE model sent is on a scale of half an inch to a foot, showing, of connected centring, sixty feet in length, and nineteen feet in width, resting on inclined planes.

It is the invention of Richard Williams, Master Carpenter in the Royal Engineer Department at Chatham, and there put into practice in a bomb proof casemate the twenty-seventh of August, 1807; by this means the centres can be lowered, until they are freed from the arches, without exposing the men, so employed, to any accident; and, at the same time, not requiring one fourth of the hands employed in the usual way.

This mode may be of great use, when the centres have to carry great weights, or when the pressure on them is rendered unequal from moisture, or other causes in tunneling, and by guarding against the evil often attending the partial easing of centres in those cases.

The

The parts of the inclined planes, next the front shores, are to be equally measured, and cut agreeably to the casing required, or until the centres are freed from the arch. Three men, having each a wooden mallet of twenty-two pounds weight, and striking at the same time, would soon drive the inclined planes the distance required.

Three screw jacks were substituted for mallets, in lowering centres of thirty feet square, and answered equally well.

R. D'ARCY,
Colonel of the Royal Engineers.

Chatham, April 11th, 1815.

To C. TAYLOR, M. D. SEC.

SIR,

IN consequence of the many accidents, which have occured from the common mode of easing centres, and on account of nine men having been lately killed in a bomb-proof cazern, I turned my mind to the subject, and have invented a method by which inclined planes can be struck, and removed externally without any person being underneath. I believe my plan will be found different from any hitherto applied for such purpose.

I am, Sir,

Your humble servant,

RICHARD WILLIAMS.

Chatham, April 20th, 1815.

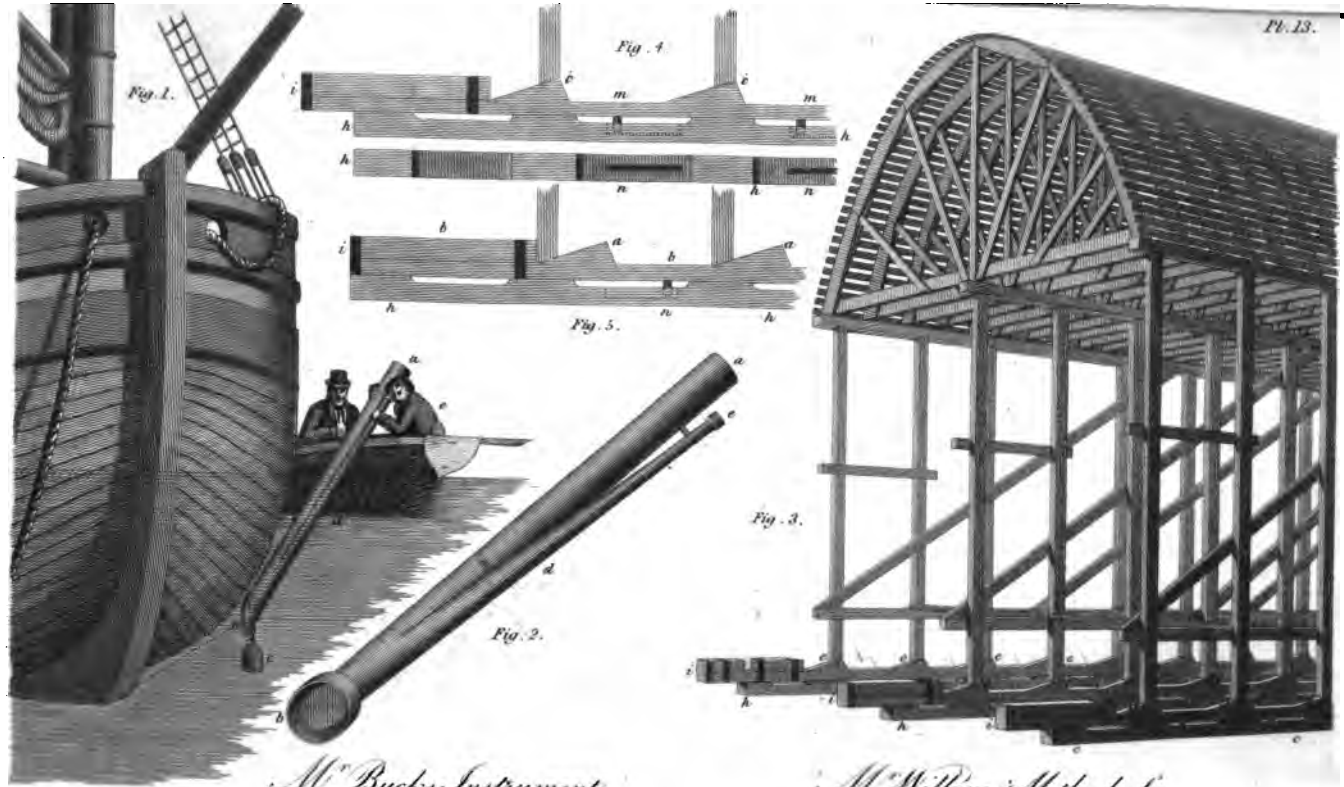
To C. TAYLOR, M.D. SEC.

Reference

Reference to the Engraving of Mr. WILLIAMS' *method of removing the Centres of Arches. Plate* 13, *Figs.* 3, 4, 5.

FIG. 3 shews the centring for arches, on three rows of upright posts, each row standing on a separate row of wedges e e e, f f f, g g g; each of these rows being in one solid piece, act together, and slide on another timber h h h; these timbers are solid under the wedges, but their surface lowered a little between, to lessen friction. The centring at first stands on the top of the inclined planes, as at fig. 4: when the centring is to be lowered, the workmen, with mallets, strike the ends i i i at once, stops being placed at the other ends, to prevent their being lowered too much; when the work has settled enough, they are driven still farther; and, after driven quite down as in fig. 5, the centring is then loose enough to take away. By this means, three men first ease, and then loosen the whole centring, without going under it, avoiding danger, and the whole centring comes down so perfectly uniform, that the arch must settle uniformly also. *Pins are fastened in the upper timbers at mm.* Fig. 4 moving in grooves n n, in the under timbers, to keep them from slipping.

The



Mr. Bucks Instrument for examining Ships Bottoms.

Drawn by Wm Alpass.

Mr. Williams's Method of removing the Centres of Arches.

Engraved by C. Gladwin.

The THANKS *of the Society were this Session voted to the* REV. THOMAS RIDGE, *of Kincote, near Lutterworth, for his Method of preventing the Necessity of sweeping Chimnies. The following Communication was received from him, an Explanatory Wood Cut is annexed, and Drawings of various Modes of applying this Principle are preserved in the Society's Repository.*

SIR,

As the state of the chimney-sweepers has for various good reasons moved the consideration of the humane part of society, and excited their benevolent wish that some plan might be formed to lay their avocation totally, or in a great measure, aside, the following easy plan for so doing is respectfully recommended to the Society of Arts, &c.

I am, Sir,

Your humble Servant,

THOMAS RIDGE.

Kincote, near Lutterworth,
October 1st, 1814.

To C. TAYLOR, M.D. SEC.

Observations.

WITHOUT going into philosophical reasons of the plans I propose, I beg leave to state the following facts :—

1st,

1st, That every recess in a chimney, whether parallel to the shaft of the chimney (as is often the case in large chimnies made smaller) if totally closed up at the bottom, or even at right angles to the chimney, is in a great measure filled with soot long before the chimney becomes foul.

2dly, In a house I formerly occupied, there was a flue from a study, which was connected with an elbow of perhaps 8 feet into an old chimney, stopped up at the bottom; and whenever it was swept, the chimney-sweepers universally said, "they need not get up the other chimney, for there was no soot in it," or words to that effect. The reason had not occurred to me at that time, nor for a long time afterwards. Just before I left the house, the bottom of the chimney was accidentally opened, when many bushels of soot were found deposited in the bottom of the upright chimney, below the part where the elbow entered it.

3dly, In visiting different manufactories, and other places where there are long flues, I have always learnt that they were continually bursting from the accumulation of soot. Considering the causes of which, together with other circumstances relative thereto, I was induced to make an experiment, by hanging my two coppers according to fig. 2; one of which was used perhaps four times every week; the other about twenty times in the year. The result in four or five months was, that in the first, the whole body of soot was found in the receiver, and not half a pint of soot and dust together in the chimney. It then remained for seven or eight months, when, again the soot was found deposited in the receiver, and an equally small quantity of dust and soot in the chimney above. On opening

opening the other at the end of nearly two years (when I left the house) the soot was found in the receiver, and none in the chimney.

4thly, In my present residence, the same experiment has been made for two years, and the same result as before.

I therefore now submit it to the public, and no doubt the idea once thrown out will be improved upon, and made applicable to many excellent purposes.

It has been my case to have lived in houses belonging to other persons; and where there has been no other opportunity of making the experiment on an extended scale, and so bringing it in a more mature state before the public. As it is, they are presented with it, in the hope that it will be found applicable to their convenience, comfort, and security, in a very material degree; and also, in some measure, tend to relieve a degraded part of society from a most irksome and injurious employment.

I have exemplified the principle by a variety of sketches sent. I have to apologize for the indifference of the drawings, which I have been little accustomed to. The intention is only to show that plan which I conceive most convenient and suitable to the above excellent purpose; and which, from a conviction of its practicability and efficacy, I shall adopt upon a larger scale, whenever I have a house of my own, or a convenient opportunity.

THOMAS RIDGE.

Reference

I beg leave also to add a circumstance which has lately come to my knowledge, which confirms, in some measure, the efficacy of my plan.

Being lately at Mr. Lush's, of Banbury, I shewed him a sketch of my plan, which, having considered, he said he could confirm it from experience, though it had not occurred to him before. That, wishing to convert a part of his house, where there was no chimney, into a temporary back-kitchen, he could not build a chimney on the outside, it being a narrow passage leading to premises not belonging to him, and the chimney could not be carried through the rooms above. He therefore built a small chimney from the ground, in his own yard, and turned an arched flue nearly in the form of fig. 1 into it, under the ceiling. There was a small hole left near the ground (in consequence of the mason observing, that perhaps some soot would fall down there), and stopped with two or three loose bricks. The soot did fall wholly, and was repeatedly taken out there. That, on the chimney being taken down above seven years after it had been built, the part of the chimney above the flue had no soot adhering to it, and the greater part was scarcely coloured with soot. I have stated the account in nearly his own words.

I remain, Sir, respectfully,

Your obedient servant,

THOMAS RIDGE.

Kincote, near Lutterworth,
Feb. 22d, 1815.

To C. Taylor, M. D. Sec.

The

The SILVER MEDAL *of the Society was this Session voted to Mr.* JOHN RAPSON, *Millwright and Brass-founder, Penryn, Cornwall, for an improved Stop or Drag for Carriages going down hill. The following communication was received from him, an explanatory Engraving is annexed, and a Model of the Apparatus is preserved in the Society's Repository.*

SIR,

I HAVE found out an improved plan for dragging carts &c. of which I have sent the Society a model. The drags are applied to the naves of the wheels, with a chain attached, fastened to the breeching of the horse, and a small pin on each side of the shaft is to go into the hole of the bar of the drag. Take out one of the pins, and you will find one wheel dragged and the other not. By leaving out both pins, the two wheels are dragged in going down hill, by the breeching bearing against the horse. The wheels will revolve round on the level road, and in going up hill undrag themselves. When the wheels are braced, two or three tons weight have very little pressure on the horse in going down hill.

If two loaded carts should meet on a narrow hill, by unhooking the drag-chain from the breeching, and hooking it to the tub-chain, the horse can be put back with the greatest ease and safety.

When the horse is put back against the hill, the two pins must be put in the bars of the drags.

This plan will answer extremely well for artillery gun-carriages, coaches, waggons, gigs, &c.

I hope this plan will meet the Society's approbation, and that they will think it worthy of reward.

I am, Sir,

Your obliged humble servant,

JOHN RAPSON.

Penryn, March 15, 1815.

To C. TAYLOR, M.D. SEC.

Reference to the Engraving of Mr. Rapson's Drag for Carriages. Plate 14, *Figs.* 1, 2, 3, *and* 4.

The drag consists of a wooden brake, applied round the nave of each wheel, the pieces of which are encircled and connected by a jointed metal plate.

To one end of this brake a small bar is attached which slides freely through a corresponding hole in a plate fixed at right angles to the shaft; a hole is drilled through this sliding bar for the purpose of admitting a pin or forelock chained to the shaft.

To each end of the breeching is attached a chain, which passing through a horizontal sheave or pully on the upper surface of each shaft, is ultimately fixed to the bar of the drag: while the bolts or forelocks remain in the holes behind the perforated plate before-mentioned, it is evident the brake cannot tighten upon or drag the wheel; but on either of those pins being removed, the wheels become immoveable.

Fig. 1, shews the brake composed of a jointed iron hoop, each piece of which is lined with wood intended to press

Mr. I. Rapson's Drag for Carriages.

Fig. 4.

Fig. 3.

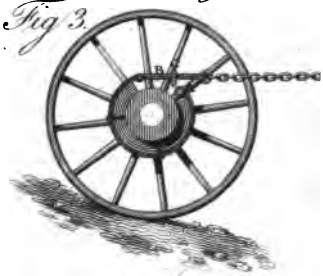


Fig. 2.

Fig. 1.

Mr. Bracy Clark's Hobbles for Horses.

Fig. 5.

Fig. 6.

W. Newton. Del.

J. Baron. Sc.

press upon the nave of the wheel. The first, a fixed pivot A, is fixed to the under side of the frame of the cart; from the other extremity of the brake proceeds a bar B, which slides through the plate or socket C, fixed on the side of the cart frame a vertical perforation is made through the bar B, just behind the plate, to receive the pin D, which is likewise chained to the shaft: this pin so placed prevents any force applied to the chain from tightening the brake on the nave of the wheel.

Fig. 2. represents the interior of a wheel on level ground, the nave surrounded by the brake, which by its own gravity is hanging loose, leaving the wheel perfectly free.

Fig. 3, shews a wheel on a declivity, the chain drawn tight by the pressure of the breeching on the horse; the brake of course closely surrounding the nave, and forming an effectual drag.

Fig. 4, is a bird's-eye view of the whole apparatus, exhibiting the framing of the cart, the shafts, wheels and brakes; the chains also are shewn, passing from the bars on each side, each round a horizontal pully on the shaft, and attached to the ends of the breeching. From this it is evident, that when a cart prepared as above is going down hill; the load, pressing the breeching against the horse, draws the brake tight by means of the chain, and produces a friction on the nave proportioned in some measure to the declivity.

When backing upon level ground, by inserting the pins D, fig. 1, through the bars of the brakes, the wheels will be kept free.

The SILVER MEDAL *was this Session voted to Mr.* BRACY CLARK, *Veterinary Surgeon, Giltspur-street, for his Hobbles, which safely cast Horses down, preventing danger to the Assistant and pain to the Animal. The following Communications were received from him, an explanatory Engraving is annexed, and the Apparatus is preserved in the Society's Repository.*

BRACY CLARK presents his best respects to Dr. Taylor, and has transmitted to him his new invented hobbles for casting horses, and confining them during painful operations, which has heretofore been a considerable difficulty, and attended with much unnecessary cruelty to the animal, from the imperfect manner in which it has been usually done. They are laid before the Society of Arts, &c. for their approbation, that the knowledge of them throughout the kingdom may be more extensively diffused, by which means much unnecessary cruelty and injury to the animal may be prevented, with greater security and convenience to the operator.

These hobbles have now been in frequent use for six years, which long trial of them has served fully to prove their great utility and advantages over any apparatus hitherto used for the purpose; they are more easy to cast the horse, more durable, and more secure. They release, in a remarkable manner, all four legs at once after the operation for which the horse is cast is performed, instead of undoing a leg at once as heretofore. The King's Life Guards have used them more than five years, and found them so useful and convenient, that they have just ordered another set. Indeed their simplicity on inspection must

must make their advantages very obvious without a more particular explanation.

Giltspur-street, 31st, 1st Mont' 1815.

To C. TAYLOR, M.D. SEC.

CERTIFICATES.

DEAR SIR,

IT is with great pleasure that I can conscientiously testify to the utility of the Hobbles invented by you, which I have used more than five years. Their durability is one advantage, but the greatest attending them is, from the firmly fixed position of the animal, and the perfect security of the operator. My life was once endangered by the giving way of the old hobbles, but now I perform every operation without dread.

My assistants join me in the approval of them, they being secured from the danger heretofore incurred by freeing one leg at a time.

I am, dear Sir,

Your faithful friend,

SAMUEL BLOXAM,

Veterinary Surgeon, 1st Life Guards.

Barracks, Jan. 30, 1815.

To Mr. BRACY CLARK, Vet. Surgeon.

CERTIFICATES to a similar effect were received from Messrs. J. and W. HARRISON, Veterinary Establishment, Little Moorfields.

R. H. BUDD, No. 56, Lower East Smithfield.

JOHN PAYTON, Assistant Veterinary Surgeon.

CHARLES NEWPORT, Veterinary Surgeon, Gray's-Inn-Lane.

Description of the New Casting Hobbles, invented by Bracy Clark, F. L. S. Veterinary Surgeon, &c. Plate 14, Figs. 5, 6.

As it is by practical improvements the veterinary art must be advanced in utility and estimation with the public; so I shall feel happy, if this little invention may be considered in a small degree contributing thereunto. This improvement in the apparatus for casting horses, and better securing them for operations, presented itself to me about six years ago; the great advantages of this plan having been fully confirmed by frequent use during this period, I have been induced to make it more publicly known.

In this way, the most painful operations may be performed upon this powerful animal with perfect safety; and I rejoice the more at the success of these means, as I well remember, in the commencement of my studies in this art, that casting the horse was attended with so much trouble and difficulty from being badly performed, that instead of it, severe twitches were had recourse to, during an operation, applied to the nose as well as the ears; and he was often cruelly beaten with whips and sticks, to make him stand quiet during the performance of firing or other operations, for which there can now be no occasion.

In casting horses after the common mode, some straw, enclosed in a knot, was used to form an obstacle to the return of the rope through the four rings; and, in order to insert it, it became necessary to relax the rope for a time, during which, if the horse struggled, he would draw the cord back through the rings, and sometimes get upon his legs again; this imperfection is wholly removed by the present

present apparatus. The knot of straw being also drawn tighter, and condensing by the struggling of the horse, would give a degree of liberty to the legs, that was often inconvenient in performing an operation, which is also removed by the present apparatus, which can be drawn as tight as you please, and afterwards is subjected to no relaxation. But a much greater advantage than the foregoing, is, that all the four legs are released at once, and the inconvenience and risk of undoing a leg at a time, after the old mode, is entirely done away. The friction and strain of these new hobbles are chiefly confined to the iron parts, which give them a duration in wearing that is almost endless. The iron chain, terminating the rope, passes or slides through the rings with less friction, if well made, than a rope would do; and, by the use of steel rollers, it acquires much less force, or fewer men in casting the horse.

The apparatus itself is represented in the plate annexed, and the following brief description will enable the reader to form a correct idea of the nature of it:—one of the hobbles, it will be observed, is made different from the rest, which we call the principal or master hobble; it is seen on the near fore leg, and is always to be placed or fixed on the fore leg of that side of the horse that is designed to be uppermost when on the ground; the end of the chain is fastened to this hobble, by means of the moveable pin A, fig. 5, which is prevented from falling out with any agitation of the apparatus, by having two or three turns of a screw in its upper part, under the thumb piece A. The chain B terminates in a swivel, received into a notch through which the pin passes, and the links of this end of the chain are made open and plain, for receiving the hook for fastening him; the rest of the links

are twisted and shorter, to run more readily upon the rings. To this chain is attached a cord C. We have preferred one of those called patent ropes, being plated of strands of equal tension, and are found not only stronger but more flexible than common ones: at the extremity of this cord is attached, for convenient use, and to prevent its being lost, the oblong curved hook of iron D.

It would appear almost needless to describe the manner of using or applying the apparatus, as it is so simple, and the plate so plainly indicates it; it is evident that on drawing the rope, the legs are forced together, and the horse is thrown down, some straw being placed on the ground to receive him: he is no sooner down and the feet drawn together, than the hook D, is passed through one of the open links of the chain, which, as it cannot then return back through the perforation in the plate E, he becomes perfectly fixed, far more conveniently and effectually, than by any noose or knot that could be devised.

The operation being performed, the removal of the pin A, sets the horse at liberty again, as the extremity of the chain can then pass without impediment through all the rings, and his four feet are all released at once.

Fig. 6, K, shews one of the hobbles separate, and on a larger scale. We may observe, that each hobble ring, except the principal, is provided with a steel roller, or case of plate steel, which, turning readily upon the iron, serves to diminish friction, though it has been found, if made simply, of a large half-round iron ring, in which way this apparatus has been used several years in the King's body guard, to answer particularly well, yet we think the rollers preferable; and it may not be without its use to remark, that if the steel moveable cases or rollers

are

are resorted to, they should be made of very stout plate steel, so strong that the chain should not, in passing through the rings, or in the struggles of the horse after he is down, be subject at all to force or indent them, which would render them perfectly useless.

The horse's tail having great command of him under the circumstances of his being poised and about to fall, has been usually my post of duty in this process; and frequently, in the moment of balancing, the opportunity is afforded of deciding the fall on the side we wish; a steady confidential man also should be placed at the head, and another of this description should manage the rope next the hobbles, taking a short hold almost close to the apparatus, pushing with the other hand against the shoulder or side of the horse, and renewing his hold as the rope passes; this, however requires some adroitness, as the horse may, if it is resorted to too soon, lean towards it, which they are apt to do when any thing is pressing against them, and so fall on the near side, that it should be desisted from if this is likely to take place, but may much assist if duly used.

In the moment of pulling the rope stationed at the tail, I take the opportunity with my foot of touching pretty sharply the hind leg on the off side, or side from the casting rope; and as he lifts up, it is drawn inwards towards the centre of the body, and greatly assists in the operation, determining also in general his fall on that side.

One hint more I might also subjoin, in respect to handling the horse; for, it is very common to see the shoeing-smiths about any operation of this sort, of a painful kind, approach the horse with a timidity and suspicion, and touch his legs and other parts with their fingers' ends, thereby creating an unnecessary alarm and irritation: he should,

should, on these occasions, be approached with confidence, and the flat hand be used with great freedom.

BRACY CLARK.

Giltspur-Street, Feb. 2nd, 1815.

The SILVER MEDAL *and* TEN GUINEAS *were this Session voted to Mr.* JOHN BARROW, *York Court, East Street, Manchester Square, for a Double Door Spring. The following Communication was received from him, an explanatory Engraving is annexed, and the Spring preserved in the Society's Repository.*

SIR,

YOU will very much oblige me by laying before the Society of Arts, &c. the model of a double door spring, which accompanies this letter. I have shown it to persons well acquainted with mechanics, who approve of its simplicity and principle. It is a spring for a door that swings both ways, and will be found to keep the door more steady when shut than any that I have seen or heard of. I will with pleasure attend and give the Committee any further explanation they may require.

The price of it will be about two guineas. Its power originates from a helical spring contained within the barrel. The action resembles that of the spring of the tumbler of a gun-lock; and it may be fixed either at the top or bottom of a door. Its strongest action is when the door

W.T. Barrow's Double and Single Door Spring.

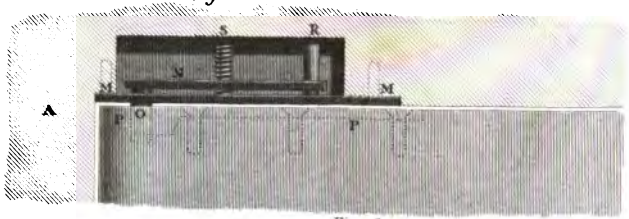


Fig. 1.

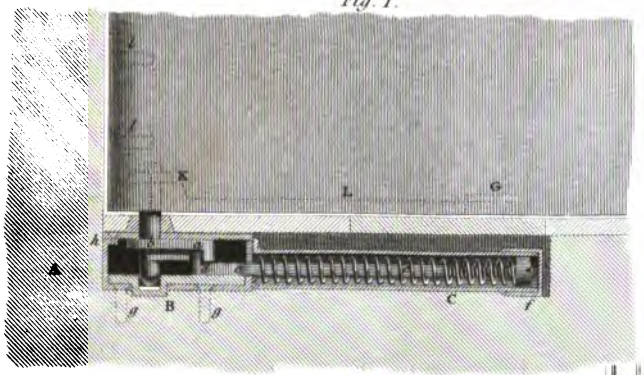


Fig. 2.

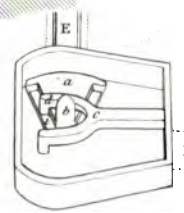


Fig. 5.

Fig. 4.

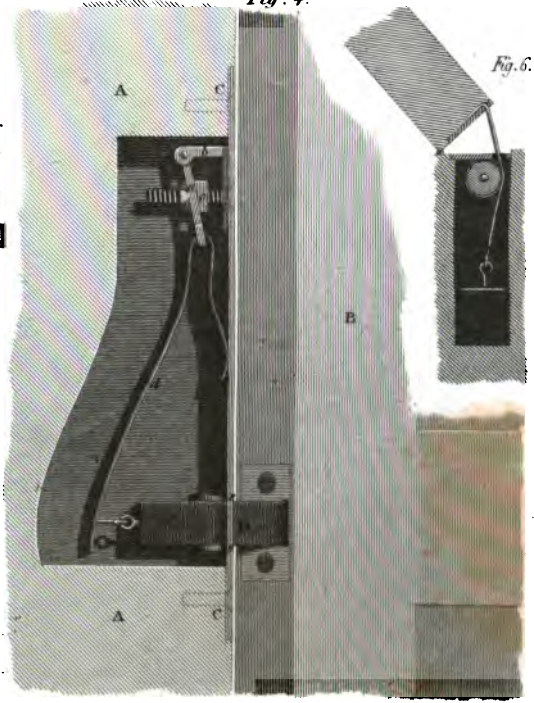


Fig. 6.

Drawn & Engraved by G. Gladwin.

door is shut; it eases itself in opening; and the power of the spring may be easily increased or diminished.

I am, Sir, with great respect,

Your obedient humble servant,

JOHN BARROW.

No. 23, York Court, East Street, Manchester Square, March 29th, 1815.

To C. TAYLOR, M.D. SEC.

Reference to the Engraving of Mr. J. BARROW's *Double Door Spring Apparatus.—Plate* 15. *Figs.* 1, 2, 3.

Figs. 1, 2, 3, represent three several views of a very complete and simple spring apparatus, which, when attached to any door, will have the power of keeping it shut when the means applied to open it are removed.

Fig. 1 represents part of a door, with one of these instruments applied to it. A A is the door frame; B C is a section of the metal-box, that contains the spring apparatus, which is fixed firmly below the floor; the axle b projecting sufficiently above the floor, to receive the brass or iron knee-frame g b, which is kept on the axle by the nut K; and the knee frame is fixed to the bottom and usual hinge edges of the door. The door so united to the knee frame requires only the pivot N to work in the hole O, at the top of the door, which is shown in Fig. 3. Any door having these instruments will not require any other hinges. To the bottom axle or pivot b, is fixed the triangular pellat, or double curved lever a, which lifts the rod c, c, whichever way the door is opened; and by which motion the spring is compressed against the top of the spring cylinder; and when the door is disengaged by the act of opening, the spring extends itself, and pulls down the

Fig. 5 shows an upper view of the parts last mentioned, and fig. 6 the action of the leathern strap upon the brass roller, and its connection with the door and spring.

The SILVER MEDAL *was this Session voted to Mr.* JAMES BRABY, *of Pedlar's Acre, Lambeth, for a Weighing Machine for family use. The following Communication was received from him, and the Machine is preserved in the Society's Repository.*

SIR,

I BEG leave to lay before the Society of Arts, &c. a new balance of my invention, with a constant self-acting weight, by which goods of any description may be weighed with accuracy. I call it a domestic balance from its being more particularly adapted for family purposes, such as weighing meat, bread, butter, &c. for which I conceive it will be far preferable to weights and scales, the weights being often lost or misplaced by servants. The common steel-yard is also unhandy for domestic use, as it has no scale to place the goods in, nor will it weigh sufficiently accurate to detect short weight in small articles. I trust this new balance will not be liable to these objections; it can be made to carry any weight and will take up very little room in a kitchen, or any other place, as it hangs flat against the wall when not in use; is not liable to be damaged or put out of repair, and always ready for use without any trouble. I hope the Committee will examine it, and if entitled to reward, it will be gratefully received by, Sir, Your most obedient Servant,

JAMES BRABY.

Vine-street, Pedlar's-Acre, Lambeth, April 11, 1815.

To C. TAYLOR, M.D. SEC.

Reference

Mr. Braby's Domestic Balance.

Fig. 1.

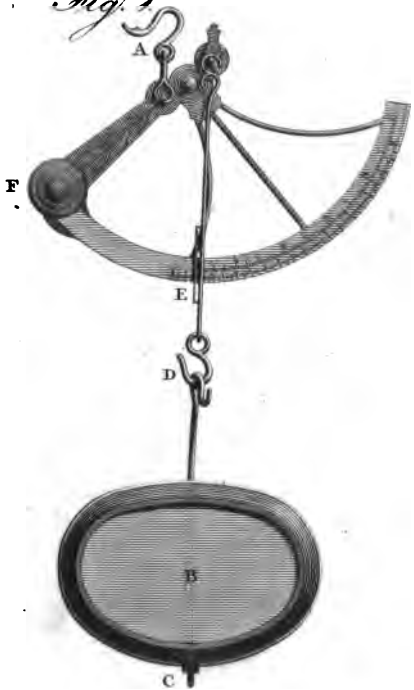


Fig. 3.

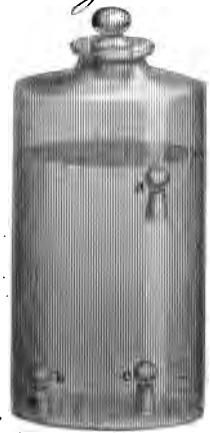
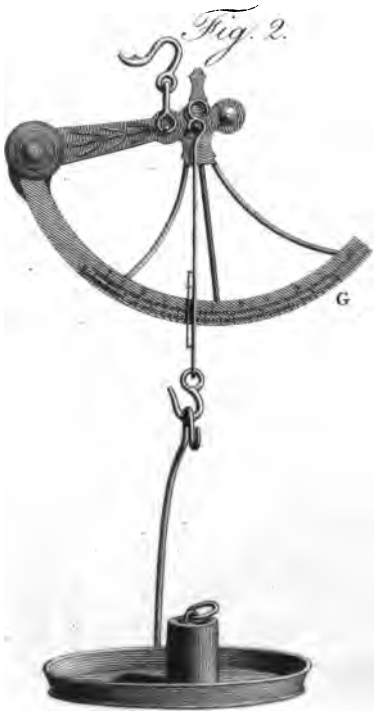


Fig. 2.



Mr. London's Hydrometer.

W. Newton Del.

J. Bacon Sculp.

Reference to the Engraving of Mr. Braby's Domestic Balance, to supersede the necessity of Weights, being an improvement upon Steel-yards. See Plate 16, *Figs.* 1 *&* 2.

The fulcrum or point of suspension in this instrument is a lever of the first order.

The weight is fixed at the longer arm of the lever. The balance, or scale for weighing, is to be suspended on one of the two centres situated on the shorter arm of the lever.

The graduated scale of weights is divided upon a segment of a circle, occupying about 140 degrees, the divisions being in two rows, each calculated for and tending to the respective centre upon which the balance and its index is to be suspended.

Fig. 1, represents the domestic balance, which is to be suspended by its hook A, from a pin in the wall, and for the convenience of occupying little room, the scale B is here turned up flat by a joint C; it thus permits articles too large for the scale to be hung upon the hook D, to be weighed.

The balance and index in this figure are placed upon that centre which is most distant from the fulcrum, and is intended for weighing goods under five pounds. The inner row of divisions tending to this centre graduated upon the arch up to No. 5, represent pounds subdivided into halves, quarters, and ounces; the index, which is a thin edge E, on the side of the balance rod in this figure, stands at 0, or Zero, the scale being empty. According to the quantity of goods put into the scale, the weight F, at the longer end of the lever, will rise until it hangs in equilibrio; the index will then shew, by the mark of the graduation, he weight of the goods in the scale.

To

To weigh any articles exceeding five pounds weight, the balance rod is to be suspended upon that centre or pivot nearest to the fulcrum, as shewn in Fig. 2; the purchase being less, a greater weight may be suspended in equilibrio; in this case the outer row of divisions G, intersected by the index, will shew any weight in the balance very accurately as far as fifteen pounds, the extent for which this instrument was intended. In this figure the scale is let down in the position most favourable for articles to be generally weighed, the weight within it serving merely to shew how the article to be weighed is to be placed.

*** Since the above Apparatus was rewarded by the Society, Mr. Braby has made considerable improvements therein, by which a machine of the same size will weigh double the weight, and accurately shew the divisions of a pound into half-ounces. He has also placed one of the improved machines in the Society's Repository.

Mr. Braby has made several machines upon the same principle, capable of weighing one hundred weight, but the sizes he recommends as most generally useful are those to weigh half a hundred.

PAPERS

IN

COLONIES AND TRADE.

The SILVER MEDAL, *set in Gold, was this Session voted to* PHILLIPS LONDON, *Esq. of Cannon-Street, for curing Mackarel for Exportation or Winter Use. The following Communication was received from him, an explanatory Engraving is annexed, and the Hydrometer, or Instrument for ascertaining the proper Saltness of the Pickle, is preserved in the Society's Repository.*

SIR,

I HEREWITH send you a half barrel of mackarel, part of twenty-five thousand mackarel cured on my plan; also Mr. Cutler's certificate, that so many were cured at Ramsgate during the last season, most of which were shipped for Russia. They were all cured by immersion in brine of British solid salt, agreeably to the method I had the honour of communicating to the Society, and which is printed in the thirty-second volume of the Society's Transactions, p. 204. The whole were extremely fine,

and full as beautiful as the specimen sent, which I hope will meet the approbation of the Society.

I am, Sir,

Your obedient Servant,

PHILLIPS LONDON.

No. 57, Cannon-Street, London,
Feb. 14, 1815.

To C. TAYLOR, M.D. SEC.

From Mr. London's statement at a Meeting of the Committee, it appears that the brine ought always to contain a redundancy of salt; in such case there is not the least danger of the fish putrifying or growing rancid, as the extra lumps of solid salt in the brine immediately act upon any watery or other liquors which proceed from the fish when inclosed in the cask. That the same process will also answer perfectly well for preserving beef or any animal food for sea store.

CERTIFICATE.

MR. LONDON cured by his new process under my immediate inspection upwards of 25,000 mackarel at Ramsgate, in Kent, during the last season

JOHN CUTLER, Licensed Fish Curer,
at Ramsgate, Kent.

September 28, 1814.

Reference

Reference to the Engraving of Mr. London's Hydrometer. Plate 16, *Fig.* 3.

THIS instrument consists of a glass bottle, with a ground glass stopper, to be filled with brine made from a solution of solid salt in water; within it are three glass bubbles, *a*, *b*, *c*, of different specific gravities, so graduated that, supposing the temperature of the air to be at sixty degrees of Fahrenheit's thermometer, and only one bubble floats on the surface, as shown in the engraving at *a*, it indicates the specific gravity of the brine to be 1.155, containing about 20 parts salt, and 80 of water, which is insufficient to cure animal matters with certainty by immersion in it.

When the second bubble, *c*, floats, it indicates the specific gravity of the brine to be 1.180, or about 24 parts salt, and 76 parts water, which may be used for the purpose of immersion.

But when the three bubbles, *a*, *b*, *c*, float, they indicate the specific gravity to be 1.106, or about 28 salt, and 72 water.

This brine will fully answer the purpose in the hottest weather in most climates, provided the rules be attended to which I had the honour to send to the Society last year, and the meat or fish always completely covered with the brine.

PHILLIPS LONDON.

covered to be the produce of a tree growing on the *Almora* mountains, and in use for various economical purposes amongst the natives. The indefatigable mind of Dr. R. did not rest until he had discovered the tree, and ascertained the process by which the *butter* was procured; it proved a new species of *Bassia*, nearly allied to Parke's *African Butter Tree*, a description and figures thereof he gave to the world in the *Asiatic Researches*.

His various discoveries of substitutes for *hemp* and *flax*, made at a time when they were an object of much national importance, are recorded in the volumes of the transactions of this Society, and in the publications of Joseph Cotton, Esq. the most valuable of which we may consider that noble palm tree the *Gomuto*, his *Sagueris Numphii*, which not only yields a large portion of the fibres called *Ejoo* by the Malays, very generally used for cables, &c. but also furnishes much *Sago-meal*, *Palm-wine*, and *Thatch* for covering the habitations of the natives where the trees grow. In *Ceylon* the fishermen make their fishing lines of single fibre, joined until of sufficient length to answer their purpose in the deepest water.

The following Copy of a Letter from the Chairman and Deputy Chairman, and of the Extract of a General Letter from the Court of Directors, to the Governor General (the Hon. Marquis Wellesley), proved highly encouraging for the Doctor to proceed eagerly in search of substitutes for *Hemp* and *Flax*, a pursuit which he had commenced many years previous to the date of those documents.

"*To the Most Noble the Governor General in Council of Bengal.*

"Having taken into our serious consideration the subject of obtaining hemp from India, we are exceedingly anxious

anxious to promote the wishes of his Majesty's Ministers on that head, and therefore recommend the same to your particular attention.

"European hemp has encreased in price since the year 1792, from 23*l.* 10*s.* to 61*l.* per ton, which is the present price. As Russia has almost the exclusive supply of this article, it is obvious that she may raise the price of it at her will. Such a precarious dependence on a foreign power for an article on which our political existence so much depends, is certainly too hazardous to be relied on, provided we can remedy the evil by obtaining a supply from our own possessions. This we conceive might be effected in this country or in Ireland, but converting so much of the best corn lands to the cultivation of hemp, might in the present state of those countries with respect to grain, be liable to objection, we see no inconvenience, however, likely to arise from growing it in India, where so much rich soil remains uncultivated. The importance of this kingdom being independent of Russia, or any other country, in her supply of this article, and the facility with which we conceive it might be raised in India, make us anxiously desirous that its cultivation there should be extended as much as possible. According to the information we have received from Mr. Bebb, late a Member of your Board of Trade, we are happy to learn, that two hundred acres are already under cultivation, and with a fair prospect of the article being brought to perfection. The present annual consumption of Great Britain may be estimated at from twenty-five to thirty thousand tons. A few thousand tons imported from India would have an immediate favourable effect upon the price of European hemp. Even the import of one thousand tons might for the above reasons lower the price considerably. Although

therefore

the commander of one or more of our returning ships, be furnished with a sample sufficient for ascertaining its quality during the homeward voyage, that they may be enabled to report thereon to us upon their arrival.

"We must at the same time call to your recollection the report which was made to you on the 24th August, 1798, by the acting Superintendant of the Company's Botanical Garden relative to the properties of the *Gomuto* tree, the fibres of which are said to be manufactured into cables and cordage of peculiar strength and durability. The Superintendant having represented that the cultivation of the *Gomuto* tree, of which we are now in complete possession, may be carried on to any extent; we direct that you inform us of the measures that have been pursued for this purpose in consequence of your resolution of the 1st October, 1790, for procuring a further supply of the *Gomuto* plant and seeds from Amboyna and Bencoolen. You will likewise furnish us with samples of the *Gomuto* rope yarn. If any shall have been manufactured into ropes and cables, we wish an experiment may be made of their quality on some of our returning ships, the commanders of whom must be directed to pay particular attention thereto, that upon their arrival they may be able to report the result.

"To Dr. Roxburgh the thriving spice plantations in *Sumatra* owe their existence, as on his representation the Supreme Government at Calcutta, authorised him in 1795—6, to send a person properly qualified to the *Moluccas*, to procure plants and seeds, particularly of the *nutmeg* and *clove* trees. And again in 1802—3, he sent his own son, then his assistant, on the same service. The result of the two expeditions may be seen in the following copy of

of Walter Ewer's, Esq. the Governor of *Bencoolen*, official report of the state of those plantations, dated the 25th September, 1803.

A general Statement of the Spice Plantations on the West Coast of Sumatra.

	Nutmegs.	*Cloves.*	*Remarks.*
Imported in 1798, and in bearing .	48	1	
Do. in blossom, and advancing to maturity	275		Besides those in the gardens of individuals.
In great apparent luxuriance of growth, but not yet bearing, .		2	
Imported by Mr. ROXBURGH, and quite young, ...	22000	7000	
Total of spice-plants . .	22323	7003	
Deduct as set apart for the garden in Calcutta . . .	1000	500	
They were not sent to the Botanic Garden.—Leaves . .	21323	6500	
Distribution of the plants lately imported by Mr. ROXBURGH.			
Retained for the Companies' Plantations, ...	8000		
Distributed to the Malay Chiefs, and villagers; and to individuals resident about Fort Marlbro, and at the out Settlements . .	13000		
Not yet dispersed, being too tender to be removed from the nursery, ...		6500	
	21000	6500	

Fort Marlbro', 25th Sept, 1803.

(Signed) W. EWER, Commissioner.

During the dreadful famine of 1791, 2, 3, which reduced the population of the *Northern Circars*, to nearly one-half of what it was previous to that calamity; he drew up, and transmitted to the Government of Madras, suggestions for the introduction and extensive cultivation of all such vegetable products as might supply food to the natives

natives when the rice crop fails, and be an effectual substitute for granaries; which were not found to answer the benevolent intentions of Government. For this Paper he received the repeated thanks of the Court of Directors, accompanied with orders to the Government of Madras to take the necessary measure for putting these suggestions into execution, which was done.

Extract from the General Letter from England;—Dated April 23d, 1794:—

"It gives us great concern to find, that, owing to the want of the periodical rains, the inhabitants of the Northern Circars, particularly those under Masulipatam, are again likely to suffer, on account of the expected scarcity of grain; but we hope the measures of the Bengal Government, for sending rice to your side of India, will lessen the calamities which a continuance of the famine would otherwise occasion. The humane suggestions of Dr. Roxburgh, referred to in the 8th paragraph of your public dispatch of the 2nd May, on the introduction of such useful trees, shrubs, and other plants as are deemed the most likely to yield sustenance to the poorer classes of natives in the times of scarcity, entitle him to our warmest praise; and we trust that your endeavours in consequence will prove successful. We deem the hints contained in the beforementioned Paper of Dr. Roxburgh of such consequence, inasmuch as they tend to lessen the calamitous effects of famine, that we desire to be acquainted from time to time of the progress that may be made in the cultivation of the seeds and plants recommended by him, and particularly whether you have been successful in your endeavours to procure the bread fruit tree from the Nicobar islands,

islands, and the tree mentioned in the Doctor's letter of the 21st February last, which bears a fruit called Mellore, and which is supposed to be infinitely superior to the bread fruit."

"We approve of the support you have given to Dr. Roxburgh's laudable efforts for introducing among the inhabitants of the coast new sources of sustenance, and new means of improving agriculture, and extending the Commerce of the country."

A true Extract, (Signed,)

W. WEBB, SEC.

His numerous experiments on the manufacture of *Indigo* and discovery of plants which yield that drug, equal in quality to the best made from the common indigo plant, (*Indigofera tinctoria*) have been already given to the public in the 81st Volume of the Transactions of this Society.

The three wild sorts of the silk-worm, viz, *Tusseh*, *Arundi*, and *Maggadooty*, described and figured by the same hand, furnish the natives with an abundant supply of three different kinds of strong durable silk, highly useful, particularly the last, in the fabrication of various durable coarse clothes, and might, we have every reason to think, be a valuable acquisition to the British artists, in the manufactures of this country. One sort only is mentioned by Mr. Colebrooke, at page 179, of his "*Remarks on the Husbandry and internal Commerce of Bengal.*" The two first viz. *Tussoh (Phalæna paphica, Linn.) Arundi, (Phalæna guthia, Linn.)* have been published in a Volume of the *Transactions of the Linnæan Society of London.*

The introduction of useful objects into our Indian territories, and the general distribution of the rare vegetable products over most part of the world, formed a very large portion

portion of his duty. The reports of the *African Institution* evince his endeavours to aid the benevolent views of the Directors thereof, and may be quoted as one instance of the liberality of the Hon. East India Company's Botanical Establishment, which he superintended. Amongst the most conspicuously useful plants introduced, are *all-spice*, *cotton* of various sorts, *nutmeg*, fruit trees of various kinds, *mahogany*, *logwood*. To these may be added new botanical discoveries of the same nature, such as several new species of *oak*, &c. yielding timber of a good quality for various purposes. His *swietenia febrifuga*, or *East India fever-bark*, an excellent substitute for Peruvian bark, which, for upwards of the last twenty years, has been successfully employed in various parts of the world, and now holds a place in our *Pharmacopeas*. In short, it would be a long and laborious task to give the bare names of his numerous discoveries; suffice therefore to say, that the number of his coloured drawings and descriptions of *Indian* plants, a large portion of them new, amount to near 3000: one of them, viz. No. 2141, is an immensely large and beautiful new species of the *fig-tree (ficus)*, which yields an abundant supply of *Caoutchouc*, or *Indian-rubber*, used by the natives of the Garrau, &c. mountains, east of *Bengal*, where the tree grows wild, to smear and render water-tight their baskets and utensils, and for torches to give light, &c. &c. *See Vol. 30, of the Transactions of this Society.*

*** The Society have great pleasure to add, that from improvements lately made, the lacc is now in extensive use, in dying scarlet or woollen cloth, in place of cochineal.

The

The following Suggestions on the means of supplying food to the Natives of India, when the Rice crop proves deficient, consequently a Substitute for Granaries, were communicated to the Society by the late Doctor William Roxburgh.

Query I. WHAT are the best substitutes for granaries, consequently for the prevention of famine, and its depopulating consequences?"

Answer. "The culture of every article of food congenial to the climate and prejudices of the people."

II. "Famine," says the *Hindoo philosopher*, "is a dreadful calamity, and originates in a want of *rice alone!* It has been incident to all ages, the *Satya*, the *Trita*, the *Dwaper*, and the *Kaliyugs*—It is the will of Iswara!"

Thus he lets the matter rest; no hint, or other attempt to lessen the effects of the *dreadful calamity*; *the mere want of rice*, by other sorts of grain, many of which are well known to be equally (probably even more) wholesome, and more nutritious than rice.

It is now (in 1814) twenty-one years since the effects of one of the most dreadful famines that we have any account of ceased in the *Northern Circars*, where it had raged, with all its dreadful consequences, for nearly three years, notwithstanding every effort of Government to send such relief as the time allowed. I was an eye witness to its effects during the whole time, and had charge of the distribution of Government rice for the relief of the poor classes about *Lamulcotah*, where above a thousand were daily fed. During this period I drew up a few suggestions for the introduction into these *Northern provinces*, of such useful vegetable productions as were deemed the

most likely to give sustenance to the poorer classes of the natives during times of scarcity; they were dated 27th January, 1793, and addressed to the Honourable Sir Charles Oakley, Bart. then Governor of *Fort St. George*. Soon after which, I was called to superintend the Honourable Company's Botanical Establishment in Bengal, though not before I had the happiness to find, that my suggestions were approved of by the Court of Directors, and orders issued by the Madras Government to have them complied with.

Since my arrival in Bengal, at the close of 1793, my thoughts have been frequently taken up with this important subject, and I have now added such remarks as time and more information have brought to my knowledge respecting the soil, state of the weather, and the husbandry of the Hindoos, which may, in some measure, tend still more to lessen the effects of a failure or deficiency of the rice crop; whether arising from too little or too much rain, or from storms, for against the scourge of hostile invasions there is no remedy but a superior force; and although we have been without apprehensions of famine, or even scarcity, for many years, yet our endeavours to avert any future appearance of such a direful calamity ought never to slacken, until some suitable commercial arrangements and permanent system of husbandry are established over *British India* at least, as will effectually relieve our minds from every danger of famine from a failure of the rice crop.

Granaries have been found defective, attended with so great a waste of grain, and so much expense, as to have rendered it advisable to discontinue or abolish them for the present.

The

The preservation of grain, (rice,) from the excessive damps of *Bengal*, and from the ravages of myriads of insects with which such climates abound, has hitherto been found impracticable. In Europe frequent screenings and ventilations have, I believe, been found the best methods; but there such a task may be called an amusement only when compared with what it would be in *Bengal*, even granting it would prove effectual there, which has not been found by experience.

On the coast of *Coromandel* grain is easier kept than in *Bengal*, because the land is so high in most parts as to admit of its being preserved in *subterraneous* granaries, made so deep as to place the grain, or roots, below the level at which they vegetate, as practised in many parts of *Russia*, and for potatoes, &c. in *Scotland*, in consequence of less humidity there, which is universally known to be highly injurious to grain, and at the same time favourable for the multiplication of insects. On that *coast*, *subterranean* granaries might therefore be attended with greater success than in Bengal.

To a person acquainted with the soil and state of the weather over the provinces immediately under the supreme government, and the various sorts of culmiferous and leguminous plants, excellent roots, herbs, &c. &c. that thrive so very luxuriantly during the cool season, I say, to such a person it will appear next to impossible for a famine, or even scarcity to take place, although no such grain as rice was known.

By the month of October it can be ascertained whether or not there will be a failure of the rice crop. If there is reason to think so, let the ground where the *paddy* has failed, or been cut, which will have been the case of the *rubbee* crop, and as much more as may be thought ad-

visable, be prepared for *wheat* and *barley, leguminous* grain and roots*.

The *leguminous* plants cultivated over *India* during the cool season, are much more numerous than the culmiferous, and though they do not by any means make so large a proportion of the diet of the Hindoos and Musselmen, yet they are very generally eaten; and to be found for sale in every market. The most conspicuously useful are *pease, motor hind,* of several sorts—*Kcessari, Lathyrus Sativus; Sona Moog, Phaseolus aureus; Halli-Moog, Phaseolus mungo, Krishna, or Khalli-Moog, Phaseolus max; Mash-Kally, Phaseolus radiatus; Moot* (Phaseolus aconiti foliüs.) Of the genus *Dolichos* there are, *Coalthi, Barbaty* and *Lobia Dolichos sinensis,)* and their varieties. Of *Cytinus*, viz. *Cajare*, there is only one species, *Oroos*. Of *Cicer* there is also only one sort, viz. *Arietinum, Bhoot*, or *Bhoat Kalai*; and of *Ervum* one species, viz. *lens*, or *Mussoer* hind. These are the principal leguminous plants known to me that are cultivated by the nations during the cool dry season, viz. from October to March, inclusive.

Tuberous roots.—The sorts that succeed during that season are few, compared to the number that require to be put in the ground when the rains begin. I know only of two (cool season roots) that can be considered interesting, viz. the common *potatoe* of *Europe*, and the *sweet potatoe (Convolvulus batatus)* or *Kokor-cunda alloo* of the Hindoos.

* The harvests over *India* are divided into two periods, or crops, the *Kharreef* and *Rubbee*, of the Hindoos. The former, or early crop, is cut in September and October, and the latter, or great crop, from December till March, or even April.—See As. Res. p: 6, 45, &c.

The

The kinds of grain which compose the *Kereef*, or early crop, will be of use over the southern parts of the *Peninsula*, but not, I fear, to the northward, as they thrive best, and are cultivated during the rains. They are the various sorts of *Holci*, comprehending the much esteemed wholesome grains, known to the Hindoos by the names, Bajerah, *Holcus spicatus*; *Jooar*, (*Holcus Sorghum*); and *Dedahn*, (*Holcus bicolor.*) Three species of *Panicum*, called in *Hindostanee*, *Cognee*, (*Panicum italicum*); *Chinna*, (P. *pilosum*), and Saumah; (P. *frumentaceum*; also Indian corn called *Bhoattah*, or *Mukka*, by the natives, *Murhna*, (*Cynosurus Crocanus*); and *coda-ka-charol* (*Paspalum frumentaceum*). These are all well known to the natives, and in many parts of *India*, form almost the whole of their food). *See As. Researches*, 6, *p.* 49. On such our chief dependance ought to be placed, for the farmers of *India*, above all others, rely entirely on the practice and experience of their ancestors, and not only condemn experiments as absurd and unnecessary, but look on them as impious; hence their dislike to the introduction of any thing new in their husbandry.

Potatoes have been known to the natives of *Bengal* more than half a century; at least, to such as reside in the vicinity of European stations: yet it is only near such places where they are reared, because there they meet a ready sale; for though the Hindoos in general like them as a luxury, yet they have not hitherto made them any substantial part of their diet. From such stations, as from so many centres, we may yet expect to see the culture extended. Such lands only as best suit this root ought to be employed, because a few bad crops would throw a great check in the way of its progress, and ought to be particularly guarded against.

For this root, the soil ought to be an open sandy loam, manured with either horse or cow-dung; and the sort or sets and soil changed every few years; for we know, from long experience, that growing plants absorb from the soil such food as suits their nature; if, therefore, the same crop is long continued, it will degenerate. Hence, the necessity of rotation, as land exhausted of the food of any tribe, or species, (say wheat) by one or more crops, yet it may contain the proper food of many other vegetables. A light friable virgin soil, (of which there is much scattered over *India*, at present in a state of nature,) I have found produce excellent crops of potatoes at *Samulcatale*, near *Coringa*, on the coast of *Coromandel*, and in the Botanic Garden at *Calcutta*. The worst soil for potatoes, or for tuberous roots in general, is of a hard gravelly nature: much of the waste, or uncultivated *jungly* land over *India*, is of this kind, and frequently intermixed with more or less calcareous grit, (*Kunkur* of the Hindoos). Stony, chalky, and stiff clay land, are also unfit for this crop; I mean in *India*, for my experience does not extend to *Europe*. The sets to be three, or at most, four inches deep, and one inch above the dung. Doubtless a potatoe crop, as in Europe, leaves the land in excellent order for any succeeding crop, which is another great inducement for changing the soil. It has been found, that various sorts spring from the seed of the same plant; it will therefore be advisable to preserve the seed of such as grow best in any particular soil for experiments. If the sets are cut a few days before they are put in the ground, they are not so apt to rot, as when set immediately after they are cut. Large potatoes make better sets than small; and where sets are scarce, or a new sort wished to be multiplied, they may be cut into two or more pieces; but I believe it has been found

that

that the weight of the crop is in proportion to the weight of the sets; this remark I have found verified in *Bengal*. In *India*, as in *Europe*, the young plants require earthing up, and the ground kept clean and light as possible, which makes the roots shoot farther, and the tubers grow larger. Cutting off the tops of potatoes at all times injures the crop.

No axiom is better known, or can be more easily discovered at first sight, than that a constant ready market and good price for the produce of labour, are the best encouragements that can be held out to the cultivator. The greatest part, if not the whole, of *British India*, immediately under the Supreme Board, produce, on an average, more grain than is necessary for its consumption, consequently, to give encouragement for a more extensive and better regulated system of husbandry, every encouragement ought to be given to the exportation of grain. The charges and dangers attending the port of *Calcutta*, and the increased price grain must be raised to, by bringing it to that port from the districts where it grows, might, in a great measure, be avoided, if one or more safe, commodious ports could be found to the eastward, and in our new and valuable acquisition *Cattack*, where grain is more abundant in proportion to the consumption, than on the banks of the *Hougly*. Such a scheme of exportation carried into execution, and returns made in *salt*, would prove one of the greatest reliefs to these provinces in times of scarcity, by enabling us to retain, by embargo, the surplus grain which the export trade would soon produce in the market, and for at least the lower parts of *Bengal*, surpass every other means that can be devised. And for the interior, wheat alone may be sufficient; at least our greatest dependence ought to be placed on it: for, above all other farinaceous

grains, it contains the largest portion of glutin, or nutritive principle.

An European requires no proof to make him sensible of this; but the natives of *Bengal*, and other *rice** countries, may. Let them therefore compare the race of men who inhabit the upper provinces, &c. West and north-west, the chief crop and staff of life is *wheat*; I say, let them compare those people with themselves, who eat little else than rice, and they must be immediately convinced of the superiority of *wheat* as the food of man.

I have often, with delight, remarked and admired the great bounty of Providence, in thus abundantly supplying the wants of man, in all climates, with the most proper materials for his food, clothing, and medicine; and for the employment of his industrious ingenuity. Probably no country in the world enjoys these blessings in such abundance as *Bengal*. A very small share of assiduity must, at all times, place its inhabitants out of the reach of famine, or scarcity, from even a total failure of the rice crop; and in times of plenty, indeed at all times, affording numerous other objects for their industry. Ignorant and careless must be the husbandry of a country, where the rights of the husbandman are trampled on; and this seems to be more prevalent in fertile *Bengal*, than over the less productive lands of *Coromandel*, where industry and skill are more wanted to render their lands sufficiently productive: for, where nature has been most lavish of her favours, as in *Bengal*, man has less to do, and more apt to indulge in idleness. To those already known, many products now

* Previous to the famine of 1769 and 70, the average price of rice was from 27 to 29 *seers* per rupee. Since that time cultivation has become more extended, and the average price may be stated at 40 *seers* per rupee.

may

may be added, which, by our own activity, aided by the cheap labour of the natives, may be exported to *England* to the mutual benefit of both countries. Such as the beautiful sorts of timber. The *Taning* (*Tannin*,) or *astringent principle* of vegetables, much wanted in *England*, and I believe no country abounds more in it than this. *Wheat**, *Rice*, *Wax*, *vegetable Oils*, *Lac* and *Lacklake*, *Glue*, *Tobacco*, *Indigo*, *Saltpetre*, *Sugar*, *Silk of several sorts*, *Manjith*, *of the Hindoos*, or *Indian Madder*, both wild and domesticated. *Cotton* for *China*, as well as *Europe*. *Bengal* will, no doubt, soon be able to furnish in abundance, after supplying her own manufacturers, in consequence of our late conquests in *Hindoostan*, substitutes for *hemp* and *flax*, &c. &c. And for her own marine yard she has, I believe, every thing except *copper* within herself. Timber of various excellent kinds in great abundance, even *Teak*, will soon be plenty. For cordage and canvas, various excellent materials abound.

* It is now six months since Dr. Roxburgh and family left *Bengal*, and he with pleasure observes, that the *Soojee*, or coarse powder of the heart of the *Bengal wheat*, which he brought with him for various uses, particularly for his childrens' diet, continues perfectly good, and may, he thinks, from its present appearance, keep good as many months more. Now, his object in making this observation, is to point out the prospect of relief this preparation of wheat holds out to *Great Britain* and her Colonies when pressed for wheat. Dr. R. suggested to Lord Mornington, when he was Governor General, the idea of sending some of this preparation to *England*, by way of experiment; for surely it is well to know our resources before want pinches.

" *St. Helena*, *August*, 1813.

" The same *soojee* continues perfectly good, a pretty large sample thereof I have just sent to Mr. Cobb, the Secretary at the East India House, with a short letter to the above effect, to be laid before the Hon. the Court of Directors, with the view of encouraging the importation of this salubrious preparation of wheat."

London, *August*, 1814.

Iron

Iron every hill furnishes. The ore of *Rajamalel* hills is said to be of the very best kind, and in plenty. *Dammer*, which answers I understand every purpose of *pitch*, is to be found abundantly in every forest where the *saul*, and other trees that yield it, grow. The range of mountains which circumscribe *Bengal*, *Behar*, *Oud*, and *Rohilcurid*, to the north and north-east, can furnish *masts*, *tar*, and *turpentine*. To these may now be added several new species of *oak*, natives of the *Garrow* range, and other mountainous districts in the vicinity of *Silket*, many of them growing to a great size, and yielding timber of an excellent quality for a variety of purposes.

QUERIES *by Government, respecting the Abolition of the public Granaries; with the* ANSWERS *by the Board of Revenue.*

Q. Whether any public Establishment be necessary in the present state of the country, in order to prevent or to mitigate the fatal effects to be apprehended from a scarcity of grain?

A. Precautions to avert or to mitigate the fatal effects resulting from scarcity of grain, have, upon former discussion of the subject, with great apparent reason, been deemed necessary; and the same necessity for such precautions, if any can be devised, appears to us, in the present condition of the country and its inhabitants, to exist with equal force.

Q. Whether, on a presumption of such necessity, the present establishment can be considered adequate to the object proposed; or, if insufficient, whether it be susceptible

ble of any modification, which would render it adequate to this object.

A. The present stores of grain would, in the proportion which their magnitude might bear to the degree of scarcity, answer the proposed purpose of averting or mitigating the fatal effects of the scarcity; but, in the greatness of the expence at which the granaries are maintainable to us, there appears an insuperable objection to their continuance; and since we do not conceive this expence to be susceptible of reduction within moderate bounds, the establishment of the granaries should, in our opinion, be abolished without delay.

Q. Whether, on a presumption that the present plan is defective, any other arrangement can be adopted, exempt from similar objections, and affording a satisfactory assurance; that Government, in making a considerable pecuniary sacrifice for the benefit of the public, will not be disapppointed, either with regard to the extent of the relief proposed to be secured to the community, or with respect to the general effect of the Institution?

A. The only plan free of conclusive objection, that could be substituted for the granaries, would be to resolve on appropriating a sum of money whenever it might be wanted, for the purpose of purchasing grain, and of conveying it to the parts of the country where a scarcity, requiring such a relief, might prevail; or of procuring relief by bounties to individual traders; or by any other pecuniary means which the exigency of the case, and the then existing circumstances of the country, might point out.

With a view to the same relief, and independent of other motives, we think it would be advisable to encourage as much as possible, a regular annual exportation of grain from these provinces; because a great part, if not the whole

whole, of the surplus upon the cultivation and produce necessary for internal purposes, which the demand of grain for exportation would occasion, might at any time be retained by embargo, and thrown back upon the markets.

The quantity of rice exported from the port of Calcutta alone appears, on an average of the five last years, to be no less than 980,000 maunds, which is an increase of one lack of maunds per annum, on the average of the six preceding years; and this we consider as furnishing a store, which, by embargo, might be resorted to in the event of a scarcity of grain.

In the event of your Lordships determining to abolish the establishment of granaries, it would be unnecessary for us to observe, that the effect produced on the markets, by the present demand of cargo rice for *Europe*, might afford a favourable opportunity for disposing of the grain in store.

Statistical

STATISTICAL TABLE, (POLITICAL ECONOMY.)

QUERIES for the BOARD of REVENUE (by request) to send in circulation amongst the COLLECTORS; with the view of having the blank columns filled by them which will help to guide us in pointing out the sorts of GRAIN and ROOTS most proper for cultivation in the several Districts, when there is reason to fear a failure of the RICE CROP.

English or Botanical Names.	*Hindoostane Names.*	*Seed Time.*	*Seed, per Biggah.*	*Biggahs cultivated.*	*Time of Harvest*	*Produce pr Biggah*	*Price on the spot.*	*Charges of cultivation.*	*Remarks on the nature of the soil, preparation, manures, sowing, irrigation, and of any other nature that may be thought necessary.*
Rice* or Paddy	Chawul rice, Dhan Paddy								
Wheat	Gom or Ghow								
Barley	Jow								
Cynosurus corocanas	Murhua								
Holcus Sorghum	Jooar								
... spicatus	Bajorah								
... cicolor	Dedahn								
Panicum italicum	Cognee								
... piilosum	Chinna								
... frumentaceum	Saumah								
Indian Corn	Bhootah or Mukka								
Pasphalum frumentaceum	Coda-ka-chawul								
Pease	Motor								
Phaseolus Aureus	Soya-moog, or moag								
... mango	Halli, moog, or moag								
... max	Halli, or krishnamoog								
... radiatus	Mash-cally, or callaich								
... Aconiti foliis	Moot, or Mout								
Dolichos biflorus	Coolthi								
... catjang	Barbaty, or Barbutty								
... sinensis	Lobia								
Cicer arictinum	Bhoot, or Bhootcalai								
Bytisus Cajan	Orror, or Orhor								
Ervum lens	Mussoor								
Lathyrus sativus	Keessari, or Kassare								
Potatoes	Batati-alloo								
Arum Colorasia	Kachoo								
... indicum	Maun-kachoo								
... campanulatum	Ol, or Bol								
Sweet Potatoe	Kokorcundo-alloo								
Yams, various sorts	Aloos								
Curcuma Augustifolia, yielding Ticorhind, or real Arrow-root									†
Cucurbitaceæ, the edible or dictic sorts									

* The varieties of this most useful grain cultivated over Asia are endless. On the coast of Coromandel alone, I detected and described above forty, all well known to the native farmers. The original wild stock, from whence I am inclined to think all have sprung, is still common on the borders of lakes, pools, &c. during the rainy season in many parts of India; its Sanscrit name is Nivara: the grain of this wild sort is much esteemed by many of the natives of the Northern Circars.

† The vacant lines below, are for inserting any other sorts of gram or roots, not in the Table, and for trees, perennials, &c. which produce edible fruit, &c. such as sago trees, plantains, cocoa nut trees, &c.

The SILVER MEDAL *of the Society was this Session voted to Captain* JOSEPH COTTON, *of the Trinity House, and a Director of the Hon. East India Company, for his great exertions in the Culture and Importation of Calooee Hemp from the East Indies, the produce of a Plant named by Dr.* ROXBURGH *Urtica Tenacissima. The following Communications were received from Capt.* COTTON, *and Samples of the Hemp, with an original Drawing of the Plant, are preserved in the Society's Repository, along with several different Pamphlets sent from him upon the subject.*

DEAR SIR,

I HAVE the honour to address you on the Calooee hemp, noticed to you by Dr. Roxburgh under the name of Urtica-Tenacissima. This parcel I have at length discovered in the Company's warehouse: I have applied to the Chairman to direct its delivery to you, which I have no doubt will be done; but it was not addressed to me, or I should have had notice of it.

Was I to furnish you with all the correspondence that has passed on the substitutes for hemp between Dr. Roxburgh and myself, it would compose a large volume. In fact, I have been most zealous upon this topic, and have taken some pains to render this country independent of the supplies from Russia, by pointing out how the weaker fibre of India produce might be made, through Huddart's Principle of Manufacture, equally useful with the Russian hemp; par-

particularly if proper selection and culture were observed in India, this might stand us in great stead in the event of future disputes with the northern powers; but the return of peace has for the present affected, not only the importation to any extent, but the culture of it, also the improvements suggested, unless for the use of shipping in the East Indies, and where I find they have lately discovered the means of incorporating tar with their coir, or the fibre of the cocoa nut, which is a much stronger material. Prejudice may, perhaps, eventually be the means of neglect, even of the Calooee hemp, so much and so deservedly the object of Dr. Roxburgh's attention. Before Sir Evan Nepean went to Bombay, I attended both Lord Melville and him to an inspection of these latter materials, and highly satisfactory was the result.

It might be advisable, notwithstanding all that has been said or done on this important matter, to cherish the improvement throughout India, and which I shall endeavour to effect on my return in April to the Direction. I take the liberty of forwarding to you some publications of mine, which will evince the interest I took on the subject; and having furnished both Lord Moira and Sir Evan Nepean with copies, I hope, from the communications they have honoured me with, that it will not be overlooked.

The sentiments of respect I entertain for your laudable Institution, will lead me ever to receive your further commands on this, and any other matters in which I can be useful, with great satisfaction; and I hope the President and Members of the Society will accept the tenders of my best regard and good wishes for the prosperity and success of these

these highly useful endeavours toward the public advantages of this happy and favoured country.

I have the honour to remain,
Dear Sir,
Your very obedient and
Faithful Servant,
JOSEPH COTTON.

Layton, Essex, Dec. 19, 1814.
To C. TAYLOR, M.D. SEC.

SIR,

I AM commanded by the Court of Directors of the East India Company to acquaint you, that the Court, understanding from a communication made by Joseph Cotton, Esq. that the Society of Arts, Manufactures, and Commerce, would be glad to receive a specimen of the Calooee hemp, prepared by Dr. Roxburgh during his residence in Bengal, the Court now present to the Society a bale, weighing about one hundred weight, which came by the ship Cambridge to England, in 1812; and I am to request the favour of receiving a copy of any reports which may be made to the Society thereupon.

I have the honour to be, Sir,
Your most obedient,
Humble Servant,
JAMES COBB, SEC.

East India House, Jan. 19, 1815.
To C. TAYLOR, M.D. SEC.

DEAR

DEAR SIR,

SINCE I last wrote to you, I have not only found the drawing of the Calooee plant, but a more particular description of it, which, for the sake of distribution, and to save the trouble of copying, I have directed twenty sheets to be struck off by the press, some of which shall accompany the copy of the drawing.

Mr. Lee's invention I have also seen; its operation is so simple and effectual, that the wonder is that no one should have before this introduced the idea.

Three gentlemen, with myself, of the Court of Directors, had a very satisfactory inspection of its effect, and we are disposed to recommend the Court to send out several to the President in India, which will enable them to furnish a material for cordage and sail-cloth, so strong, so pure, and in such order for manufacture, that the wants of this country, under any emergency, may be supplied.

I am, dear Sir,

Your obliged and obedient servant,

JOSEPH COTTON.

Leyton, June 24, 1816.

To C. TAYLOR, M.D. SEC.

DEAR SIR,

I AM induced to believe that at some future period we may be under the necessity of resorting for hemp to other parts than Russia, at least it is prudent to be prepared

against such an emergency; I shall therefore renew my communications with the present Botanical Superintendant at Calcutta, to stimulate the cultivation of the Calooee, having already written to Earl Moira thereon very fully, and which will, I trust, not suffer the neglect of this newly-established attempt at a substitute for hemp to languish, or be suppressed. I will furnish a few copies of the book I sent to the Society. Many are about to be sent to the residences in India to keep the spirit alive. Improvement must result, and if they benefit there so far as to the exclusion of cordage made from Russian hemp, the foundation of a supply will be laid for a time of scarcity here.

You will, I have no doubt, admire Dr. Roxburgh's zeal and endeavours.

I remain,

Your very sincere, and

Humble servant,

JOSEPH COTTON.

Leyton, Dec. 11, 1815.

To C. TAYLOR, M.D. SEC.

SIR,

IN order to forward the views of the Society for the Encouragement of Arts, &c. we requested Mr. Lee to prepare some of Dr. Roxburgh's Calooee hemp, by his patent machinery, to ascertain the relative value of the Calooee hemp, and we beg leave herewith to enclose Mr. Lee's letter,

letter, containing the result of his experiments, for the information of the Society.

We are, Sir,

Very respectfully,

Your obedient servants,

COOKE, FISHER, & Co.

Agricultural Repository, June 14, 1815.

To C. TAYLOR, M.D. SEC.

GENTLEMEN,

IN reply to your favour of yesterday, and for the information of the Society for the Encouragement of Arts, &c. concerning the fibre which you sent to me under the name of Calooee hemp; it appears to have been peeled off the plant while the plant was in a green or wet state; and this circumstance renders the fibre of much less value in the state in which it is imported. It also renders it more difficult to be cleared from the bark and extraneous matters, than it would be if the plants were taken dry, without water steeping or dew-rotting. But when the article is cleaned it is strong, soft, and free. Under proper management the fibre of this plant would be of more value than the best Russian hemp for most of the purposes for which hemp is used, and it may be made so fine, that in many cases it would answer the purposes of flax.

I am, Gentlemen,

Your very obedient servant,

JAMES LEE.

Oldford, June 14, 1815.

To MESS. COOK, FISHER, & Co.

Agricultural Repository.

Remarks on and further Description of the Calooee Hemp, or Urtica Tenacissima. R.

Shrubby, erect, ramous; leaves alternate long-petioled, broad-cordate, grossly serrate, hoary underneath; panicles axillary; flowers in round fascicles; the male on the lower panicles, and the female on the superior.

RAMEUM MAJUS. *Rumph. amb. 5. p. 214. t. 79. f. 1,* which is a very bad representation of our plant, but as the description agrees pretty well, we may conclude they are the same.

RAMY of the Malays or *Pullo Penang.*

CALOOEE, *Marsd. Hist. Sum. 75.*

KANKHURA, or KUNKOORA, of the inhabitants of Rungpoor, where the plant is cultivated for the fibres, of which the fishermen of that district make their fishing-nets.

It is a native of the island of Sumatra, &c. where it is cultivated for its fibres, which are abundant and of very great strength and fineness. In the Botanic Garden at Calcutta, (where it has been introduced from all the three places above mentioned) it grows very luxuriantly, and blossoms about the close of the rainy season, in October and November. To procure the fibres, Marsden says, the shoots are cut down, dried, and beaten; after which the rind is stripped off. Rumphius's *Ramium Majus,* which I take to be this, yields also fibres of the same nature, and is quoted by Wildenow for *Urtica Nivea,* which from the prevailing definition of that plant, "*Foliis suborbiculatis utrinque acutis, vel basi attenuatis,*" I must conclude to be a different species; for in all the plants in the Botanic Garden, originally from Sumatra, from Prince of Wales Island,

Island, and from Rungpoor, they are uniformly broad-cordate. Both male and female inflorescence glomerate panicles. Calyx of the latter of one leaf, and the germ destitute of the barren filaments which Lourieros gives to *U. Nivea.*

DESCRIPTION.

Stems when suffered to remain, they become stout and ligneous, and then covered with brown somewhat scabrous bark.

Branches many, spreading considerably, even drooping; the ligneous parts with bark like the stems; the tender clothed with diverging, soft, white hairs. When cut down to the ground, numerous straight, simple shoots soon spring up to a height of from one to eight feet, according to the season, quality of the soil, &c.

Leaves alternate, long-petioled, cordate, grossly serrate, acuminate, hairy, and hoary underneath, three-nerved; from three to six inches long, and from two to five broad.

Stipules uniform, one on each side of the insertion of the petioles.

Panicles in axillary pairs, glomerate, about as long as the petioles, villous.

Flowers numerous, small, greenish yellow, collected in small globular heads; male on the inferior panicles, and female on the superior.

Bractes minute and mixed amongst the subsessile flowers.

MALE.

Calyx of four ovate, concave leaflets.

Corol none.

Nectary a globular pedicelled gland on the centre, resembling a pistillum.

Filaments four, *anthers* two-lobed,

FEMALE.

Calyx one-leaved *, oblong, hairy, mouth entire, much contracted, and embrace so closely the base of the style, as to appear the tunic of the *ovula*, which is single, and attached to the base.

Corol none,

Stamina none.

Germ oblong, minute, no filaments surround it, (as in Lourieros *Urtica Nivea*). Stigma single, hairy, and about the length of the germ.

Seeds, they have not been found in a ripe state.

1810. We have now had this plant six years in the Botanic Gardens; the roots of the original shrubs, as well as their progeny, are becoming daily more extended, and continue healthy and vigorous; throwing up numerous shoots as often as they are cut down for the fibres of their bark, which may be done about three or four (rarely five) times every year, if the soil is good, and care taken of the plants, viz. keep them clear of weeds, water them when the weather is so dry as for the soil to require irrigation, or carefully drained when too wet.

It is as readily cultivated from cuttings as the willow, which is fortunate, as I have never yet found it produce fertile seed. Various ways have been tried to clean the fibres of the bark of this plant, since its introduction into the Botanic Garden. That recommended by Marsden has always completely failed with me.

The following account of the plant, and mode of pre-

* When I first described this plant, I had not discovered this organ and there simply stated its absence; I have, however, with the help of a powerful lens, detected it.

paring

paring the fibre, was sent from Prince of Wales Island, with some of the plants, by Mr. Phillips, who says—

"The *Ramy* plant is hairy, and thrives almost any where, but grows most luxuriantly if a little shaded, and planted in a young soil: it extends its root like the yam, throwing out from it shoots which spring up perpendicularly, attaining in four months, the height of eight or ten feet, when they flower, and are become fit to be cut down. From the root other shoots again spring up, which in two months more will be again fit to be cut, and so on successively, I am told, for almost any period, becoming in a short time a complete jungle. In forming a plantation of it, it is therefore not necessary to plant out the seedlings higher to each other than two or three fathoms. The Malays use the fibre for sewing thread and twine, and for making fishing-nets, and the quantity is so small that they require for these purposes, that they have not had recourse to any particular mode of stripping or cleaning it; they merely steep the shoots in water for ten or twelve days, and then peel off the bark, and dry it in the sun. I have *heard* that the thread is injured by salt water, but I do not think the account I have had of the circumstance is to be depended on, and certainly from the nature of the plant, the facility with which it appears it may be cultivated to any extent, the great strength of the fibre, and the threatened scarcity of ropes for the use of the Navy, it is worth while making experiments of it."

This method failed as completely as Marsden's: indeed only two or three days maceration renders the fibre as tender as bad flax, and does not tend to render the removal of the tenacious pulp, which envelopes them, less difficult

to remove. Every kind of steeping, scalding, and coction that could be thought of, have been tried in vain.

The late Dr. Charles Campbell, of Bencoolen, directs the shoots to be cut when about six feet high, and immediately stript of the bark, and its exterior green coat scraped off: this is the whole process which he says the Malays about Bencoolen follow, when the fibre is wanted for common twine, and coarser purposes; but when wanted of a bright colour and fine, he says, the scraped fibres are put into a vessel with warm water, and steeped for two days and two nights. Nearly the same practice is followed in Rungpoor, and is what I have hitherto found the best. It is tedious, as at first a man rarely cleans more than half a pound of the fibre in a day, but after some little practice they do nearly a whole pound. Every other mode which I have tried, particularly maceration of any kind, weakens it more or less, according to the length of time it has been continued. From this quality of the fresh fibre, we might be inclined to think it an improper material for fishing-nets, &c. employed in water, which, however, does not seem to be the case.

During the rainy season, that is from June to October inclusive, from two to three months is the usual time the shoots require to be fit for cutting: and about the same time during the hot season, say from March till May inclusive, if there are frequent showers, which is often the case; or irrigation answers the same end: the other four months of the year its vegetation in Bengal is slow, and in that period can be reckoned only capable of yielding one crop of shorter and firmer shoots, fit for cuttings to propagate by.

W. R.

To

To JAMES MONEY, Esq.

Secretary to the Board of Trade.

SIR,

I Have received your letter of the 17th inst. with the two Extracts therein mentioned, and beg you will be pleased to inform the members of the Board of Trade, that since the beginning of my botanical career, no plant has given me more anxiety than that which produces the Calooee.

From the receipt of the first sample sent to me by Mr. Ewer from Bencoolen, I saw its quality was uncommonly interesting, and promised to be superior to every other vegetable fibre I had seen. I was therefore more than usually solicitous to obtain the plant which produced so promising a material, as a substitute for both hemp and flax, and in 1803, four were received into this garden, from Mr. Ewer at Bencoolen; since which period, some thousand plants have been reared from these four, so readily does it grow and multiply. But to this day I have not been able to discover a ready way to clean the fibres. At present a man rarely cleans more than half a pound in a day, which alone comes to sixteen rupees the maund. I understand the Malays on Sumatra follow the same mode of cleaning which I have hitherto found the best, viz. by scraping away the pulpy parts, &c. immediately when peeled from the fresh cut shoots: no kind of maceration nor coction have I found to answer; however, as I have applied for information to various quarters, and am still making experiments myself, I do not yet despair of falling on a more profitable method than scraping. The plant has every advantage we could wish in growing readily

dily in this country, being perennial, and yielding three or four crops or cuttings annually; so that if we can only overcome the obstacles that now present themselves in cleaning the material, I am inclined to think it would in the course of time supersede every other material, for canvas and cordage, yet known. I would therefore, by all means, recommend as extended a cultivation as the plant will admit, which must be very limited for years yet to come, because it has not hitherto produced good seed, nor even from its native country could I ever obtain any, which is scarce to be expected from a plant usually reared from cuttings and slips, (as in the common pine-apple, plantain, &c.) a mode of culture which soon deprives them of fertile seed. This plant must therefore be multiplied by suckers, cuttings, and layers, which can best be done during the rains.

This garden will contain all that I can rear for at least one or two years; it cannot therefore in any way interfere with orders of the Honourable the Court of Directors, for the provisions of Sunn for years to come.

The labour in this garden has, within these few years, been so very much added to by the extensive plantations of Teak adjoining, and lately by making experiments on the culture and preparation of Sunn, that it will not be in my power to do justice to this new branch of rural economy, without some addition to the number of labourers now employed; I must therefore beg the Board will be pleased to apply to Government for permission to employ an additional number of twelve men, that advantage may be taken of the first rains of the season, to peel off the bark, and clean the fibres of the viscid mucilaginous pulpy matter with which it abounds. Convicts may be employed,

ployed, but to multiply and cultivate the plant, I cannot make these people serviceable.

I am, &c.

(Signed) W. ROXBURGH,
Botanical Superintendant,

Botanic Garden, March 22, 1809.

A true Copy,
(Signed) JAMES MONEY, Secretary.

A true Copy.

HY. ST. GEO. TUCKER,
Secretary to the Government.

N. B. The introduction of Mr. Lee's machines into the East Indies will, it is expected by Capt. Cotton, obviate many of the difficulties which have occurred in the preparation of this fibre, and it is hoped that considerable quantities will soon be imported in a perfect state.

*** It is a curious circumstance, that at the time the Calooee hemp, the product of Sumatra, in the East Indies, was under the investigation of the Society, a similar plant and fibre was submitted to their consideration by Mr. CHARLES WHITLOW, under the name of *Urtica Whitloena*, discovered by him on the borders of the various lakes in Canada; it is a perennial plant, produced there without culture in great abundance.

The

The SILVER MEDAL *was this Session voted to Mr.* CHARLES WHITLOW, *of Canada, for his Method of preserving Potatoes for Sea Stores, or foreign Consumption. The following Communication was received from him.*

SIR,

THE usual mode at present practised for endeavouring to preserve potatoes, is to leave them after digging exposed to the sun and air until they are dry, this exposure generally causes them to have a bitter taste, and it may be remarked, that potatoes are never so sweet to the palate as when cooked immediately after digging. I find that when potatoes are left in large heaps or pits in the ground, that a fermentation takes place which destroys the sweet flavour of the potatoes, in order to prevent that fermentation, and to preserve them from losing the original fine and pleasant flavour, my plan is (and which experience proves to me to have the desired effect) to have them packed in casks as they are digging from the ground, and to have the casks, when the potatoes are piled in them, filled up with sand or earth, taking care that is done as speedily as possible, and that all vacant spaces in the cask are filled up by the earth or sand; the cask thus packed holds as many potatoes at it would was no earth or sand used in the packing; and as the vacant spaces of the cask of potatoes so packed are filled, the air is totally excluded, and cannot act on the potatoes, and consequently no fermentation can take place.

I sailed from New York to St. Bartholomew's, and brought with me two hundred barrels of potatoes packed in the above manner; on my arrival at the island I found,

as

as I expected, that the potatoes had preserved all their original sweetness of flavor, in fact, as good as when first dug, having undergone no fermentation, nor in the slightest degree affected by the bilge or close air of the ship. Some barrels of the potatoes I sold there, and at the neighbouring islands, for four dollars per bushel; and at the same time potatoes taken out in bulk without packing, and others that were brought there packed in casks, which had not been filled up with earth, sold only for one dollar per bushel, they being injured in the passage by the bilged air and fermentation, being bitter and bad, whilst mine were as perfectly sweet and dry as when dug: what remained I shipped from St. Bartholomew's to Jamaica, where they arrived in equal good condition, and sold at a higher price than they had brought at the former island; some of these casks of potatoes were put in a cool cellar by the purchaser at Jamaica, and on examining them when I was leaving the island two months after, I found that they had, in a very small degree, sprouted, but that all their original flavour was preserved. Reflecting seriously on this discovery, it suggested to my mind the idea of proposing to the British nation a mode of supplying their West India Colonies with a good and wholesome food for the negroes, and also for the white people, and which would find an additional market for the farmer at home, a valuable freight for the merchant, and a more extended market for the lumber of the North American Colonies, viz. of Canada, Nova Scotia, &c.

It is well known that our ships in the West India trade in general go out in ballast, or not more than one-third freighted, carrying out some small quantity of European commodities; but the bulk of their freight consists of empty casks, and materials for making casks. It is also well

well known how valuable a food potatoes are in the West India islands, and how much they are prized there; no one acquainted with the West Indies and its commerce, but must be aware how much labour of the unfortunate negro is at present employed in making casks, puncheons, &c, for bringing home the produce, and of what immense value casks are there. Let timber imported from our North American colonies be made into casks, hogsheads, rum puncheons, coffee barrels, &c. &c. let these be filled in my mode, as described with potatoes, I contend, that the value of the casks which bring out potatoes will more than compensate for their freight, and the earth will keep the cask perfectly sweet and ready, without any labour, to bring home any produce.

The potatoes must come cheap to market, the ship owner can afford cheap freight, having now none, or next to none, for his outward-bound vessels.

The farmers on the sea-coast can easily supply more than two hundred thousand tons of potatoes, and the population of the West India islands would consume more than that quantity.

Any overplus required may be readily supplied in like manner in Nova Scotia, Cape Breton, Canada, &c. The food of the negro is at present Indian corn and meal, which, with a small quantity of potatoes now used in the islands, was formerly principally supplied by the United States, who received in return, in cash and produce, nearly ten millions of dollars. Potatoes and fish, together with the produce of the islands, will give a much more wholesome food, in a greater abundance, and at a more reasonable rate.

The policy of our legislature surely should be to encourage the parent state and the colonies, supplying each other

other in every possible manner, and to discourage Aliens from reaping advantages from British capital, industry, and exertion, more particularly so when by judicious arrangement both the colonies and the mother country can have their wants supplied better from their super-abundant productions than from foreign states, proper encouragement for the fisheries of Newfoundland, with settlements for those employed in that part of the service on the coast of our settlements in North America, is indispensably necessary—markets there are in abundance for the employment of more ships and seamen than we have now in that trade.

By my plan of preserving potatoes, a wholesome food will be provided for the West India islands, much better and cheaper than they possess at present. A valuable freight for our outward bound shipping, which they now want. This plan will in some measure enable the merchant to have his return freight cheaper, and thus we do away with the idea of having our islands dependant on the American states for food. We save an immense sum of money annually given to foreigners; and to the man of humane feeling it must be a source of gratification to see that by this mode the severe labour of the poor black is much lightened, his condition ameliorated, and by having less occasion for his labour, aiding to abolish that horrid traffic of the Slave Trade. We find a market never before discovered for our agricultural exertions, giving healthful and beneficial employment to many families at home and abroad, and a saving to the nation at least of five hundred thousand pounds annually.

CHARLES WHITLOW.

London, New York Coffee House,
Feb. 12, 1816.

To C. TAYLOR, M.D. SEC.

The

*** The communication of H. B. WAY, Esq. printed at page 45, of the present Volume, on the preservation of Carrots during the winter months, is a confirmation of the plan proposed by Mr. WHITLOW, for preserving vegetable roots a long time fit for food.

RULES

RULES AND ORDERS

OF THE

SOCIETY.

DECEMBER 30th, 1815.

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RULES

RULES AND ORDERS.

SECT. I.

Of the Officers, and Manner of their Election.

I. THERE shall be One President, Sixteen Vice-Presidents, Two Chairmen to each of the standing Committees of the Society, a Secretary, an Assistant Secretary, a Housekeeper, and a Collector of the subscription money; which officers shall be elected, by ballot, on the twenty-second day of April annually; unless when that day happens on a Sunday, or on Good Friday, or Public Fast-day, in any of which cases the election to be on the following day; and on that day no other business of the Society shall be transacted.

II. In order to this election, the President, one of the Vice-Presidents, or, in their absence, some other member appointed by the majority, shall take the chair at eleven of the clock in the forenoon; two ballotting glasses, marked A and B, shall be placed before the chair, the one for receiving the ballotting lists marked (A), and the other for receiving the ballotting lists marked (B), and stand open for receiving lists until two of the clock in the afternoon: at which hour the ballot shall be closed, when three scrutineers to each ballotting glass shall be nominated by the President, or presiding member, to ex-

amine the lists; but, in case not more than five members shall attend to the vote on that day, the officers of the preceding year shall be continued till the next general election. That at the beginning of every election of a President, Vice-President, or Vice-Presidents, Chairman or Chairmen, the presiding member shall begin by calling over the names of the persons proposed as Candidate or Candidates for that election, in order that it may be known whether such Candidate or Candidates be in arrear; and that no member shall be eligible to be a candidate for President, Vice President, or Chairman of a Committee, whose subscription shall be one year in arrear.

III. A sufficient number of printed ballotting lists of all the officers in being, according to the forms annexed (A B) shall be ready: containing also the names of members if any recommended by the Committee of election, in which if any member chooses an alteration, he is to strike his pen across the printed name or names of such as he disapproves, and write on the blank side the name or names of such as he would substitute in their place; and no printed list shall be circulated in any of the Society's rooms on the day of election but that recommended by the Society.

IV. Each member shall deliver his lists folded up to the President, or presiding member, to put into the glasses; and the collector, sitting on the side of the chair, with a list of the members before him, shall mark the name of each member so delivering in his lists.

V. When the ballot is closed, one of the scrutineers shall open and read aloud each list, and file it, while the other two or more mark the names; and when all the lists are drawn, the marking scrutineers shall cast up and report

rt the same to the chair; after which the President, Vice-President, or presiding member, shall declare the persons who have the majority of votes to be the officers respectively for the ensuing year.—Such elections shall likewise be declared again at the next meeting of the Society.

VI. If the President, or any of the Vice-Presidents, shall resign or die, the remaining Vice-Presidents shall continue to act and preside at the meetings of the Society, in the order they are placed in the election list, until the next annual meeting for the choice of officers, or some other general, or extraordinary general meeting, which the Society shall please to appoint for such particular election.

VII. If any of the offices of Secretary or Assistant Secretary, Housekeeper, or Collector, shall become vacant, a person shall be appointed, at the next meeting of the Society, to act in such respective office of Secretary, Assistant Secretary, Housekeeper, or Collector, until the next general meeting, or an extraordinary general meeting, which shall be appointed for electing a person by ballot, to fill the vacant office for the remaining part of the year.—In case the office of Secretary, Assistant Secretary, Housekeeper, or Collector, be at any time resigned, which resignation shall take place on a subsequent day, it shall be in the power of the Society to proceed to the election of a proper person to fill such office on such resignation taking place, or to nominate one to hold it *pro tempore*, until such office shall be filled up. But no person shall be entitled to ballot at the election of any of the said officers, in case of a vacancy by death, resigna-

tion, or removal, who shall not have been a member previous to the declaration of such vacancy, unless he shall become a perpetual member.

VIII. At all elections of officers, if the suffrages should be equal, the decision shall be by lots, prepared by the scrutineers, and drawn by the President, Vice-President, or presiding member.

IX. Notice of the annual, or of any occasional election of officers, shall be published three different days, in such newspapers as the Society shall order, one week at least before the day of election.

X. Notwithstanding the election of officers is annual, the Society reserve to themselves the power of removing either the Secretary, Assistant Secretary, Housekeeper, or Collector, by two general or extraordinary general meetings: in which case the said officers shall be paid their salaries in such proportions as may be then due to them.

XI. Neither the Secretary, Assistant Secretary, the Housekeeper, nor the Collector of the Subscriptions, shall be members of this Society.

XII. No person, except he shall have been an officer the preceding year, shall be admitted as a candidate for any lucrative employment, without having personally presented his petition or memorial to the Society, sixteen days before the day of election; which petition or memorial shall be read immediately after the first, and again after the second reading of the minutes. And in case of its being referred to a committee to examine and report on the qualifications of the candidates for any lucrative office, such committee shall not enter on their examination of the candidates, until within fourteen days of the day fixed for the election (of which meeting for

for examination notice shall be given to all the candidates), and they shall examine all the candidates who attend for such purpose, in the order in which their names occur in the alphabet. No member of this Society shall be eligible as a candidate for any lucrative employment in the gift of the Society, who shall be present, or act as a member, at any meeting or committee of the Society, after he has declared by word, message, or otherwise, his intention of becoming a candidate.

XIII. No officer who receives a salary, or servant, shall be entitled to any premium or bounty whatever from the Society.

XIV. No officer or servant shall presume, under any pretence whatsoever, to accept of any present or gratuity from any candidate for a premium or bounty, or any tradesman having dealings with the Society, or any person coming to see the machines on account of such premium, bounty, dealings, or inspection.

XV. No officer, servant, or person, employed to shew the machines in the several repositories, shall accept any gratuity from the maker or seller of any machines made after models or machines, for which the Society have adjudged any premium or bounty.

XVI. A Messenger shall be chosen or removed at any meeting of the Society; and so long as he continues in their service, he shall be paid a salary of seventy pounds a year.

SECT. II.

Duty of the President, Vice-Presidents, and Chairman.

I. THE duty of the President, Vice-President (in the order they appear in the list), or Chairman, is to preside at all meetings, with his hat on if he pleases, to regulate the debates of the Society; to state and put questions, both in the affirmative and negative, according to the sense and intention of the meeting; to check irregularities, and keep all persons in order; to direct summonses for all extraordinary general meetings; and to execute, or see to the execution, of all the rules and orders of the Society.

II. The President, or any one of the Vice-Presidents, shall sign receipts for the subscription money.

SECT. III.

Business of the Secretary.

I. He shall attend all meetings and committees of the Society; he shall take down all minutes of the committees, and produce them fairly written at the ensuing meetings. He shall read all the minutes of the meetings and committees to the Society; and translate such communications into English as shall be in any other language. He shall prepare all answers, when ordered by the Society, in such language as shall be directed, and lay the same before the Committee of Correspondence, for their examination, unless the Society shall judge an immediate answer necessary. He shall prepare an annual historical register of the Transactions of the Society, beginning every year from the first day of July, and ending the last day of June following.

ing. This register shall contain an account of all premiums bestowed, with the names of the persons who have received them, digested under proper heads: a list of the premiums offered by the Society, and upon what condition, and the number of members. He shall also prepare an account of the amount of annual and life subscriptions separately, the money in the Bank, and in the Collector's hands, as they shall have stood on the last day of June, and of other sums received during the preceding year; and what have been the expenses, in officers, servants, apartments, and workmen's and tradesmen's bills of all sorts. He shall prepare the list of members, advertisements, and other publications ordered by the Society; and take care that the same be properly and correctly printed: and his name, or that of the Assistant Secretary, as by order of the Society, shall be signed to all publications. All the letters or written papers of the Society shall be kept under his care, and ready to be produced by him for the inspection of the members. He shall visit manufactories, or apply to the manufacturers for information, when required by the Society; and he shall, as much as possible, endeavour to make himself acquainted with the nature and circumstances of the several arts and manufactures of this and other countries.

II. The Secretary shall read the whole of the Eleventh Section of the Book of Rules and Orders, at the time when the standing Committees are appointed to be declared in the Society; and also at the opening of the business in the general committee of election, ordered to be holden on the Friday following annually. And in consideration of his constant attendance, abilities, and diligence, he shall be paid a salary of two hundred and fifty pounds a-year, and be supplied with coals and candles.

SECT.

SECT. IV.

Business of the Assistant Secretary.

I. THE Assistant Secretary shall attend every day at the office of the Society from the hours of ten to two, during the sessions of the Society, and such further time as may be necessary to perform the business of the Society in his department, and at all meetings of the Society, and read the letters received. He shall likewise attend committees, when particularly ordered by the Society, or by one of the Chairmen of such Committees. He shall take down all minutes of the Society's proceedings, and produce them fairly written in the Minute-book of the Society at the ensuing meeting. He shall enter in the Reward-book, under their proper classes, the rewards bestowed by the Society, and make indexes to all the Minute books, and to the Transactions of the Society intended for publication. He shall paste all letters and papers in the Guard-book. All the written books of the Society shall be kept in the Society's office for the inspection of the members. He shall transcribe all papers or letters that have been prepared by the Secretary or approved by the Society, or by the Committee of Correspondence and Papers. He shall, together with the Secretary, examine the proofs and revises of the Society's publications—And as a satisfaction for such services, he shall be paid a salary of one hundred and twenty pounds a year.

II. Any member having obtained leave to take copies of the proceedings or papers of the Society, shall pay to the Assistant Secretary, for writing the same, after the rate of two-pence for every hundred words.

SECT.

SECT. V.

Business of the Housekeeper.

I. THE Housekeeper shall have an apartment in the house of the Society, that she may be ready on the spot to receive messages, letters, and all matters brought to the Society; to answer all enquiries; and deliver plans, lists, &c. to such members as shall come or send for them, of which she shall take care to have a sufficient number. She shall have the custody and care of all the furniture, books, such papers as the Society shall think proper, and other effects whatever, belonging to the Society. She shall have the direction of all the inferior servants. She shall receive and have charge of all the matters sent to the Society by candidates for premiums, and shall enter them properly, at the time when delivered, in a book for that purpose. She shall keep a fair inventory of all the goods and effects of the Society, to be always ready when called for. She shall keep an account of all stationary wares, printed books, coals, candles, and all other particulars sent in by tradesmen for the use of the Society, in a Day-book for that purpose; and shall enter the same fairly, under their several heads, in another book, to be laid every month before the Committee of Accounts, as a check on tradesmen's bills. For all which services she shall be paid a salary of seventy pounds a year; and fifty pounds to pay the servants, for cleaning the rooms and furniture; and other incidental charges to which she is liable.

SECT. VI.

Business of the Collector.

I. THE Collector shall give such security as the Society shall require, for the trust reposed in him. He shall collect the subscription-money from the members, as it becomes due, paying all he collects, over and above one hundred pounds, into the Bank of England, in the names of the two Chairmen of the Committee of Accounts for the time being, which sum of one hundred pounds he may reserve in his hands to defray the current expences of the Society. He shall attend all Committees of Accounts; and at every meeting of the Society he shall lay before them the Bank-book, with an account of what money he has received, paid into the Bank, or remains in his hands. He shall keep the cash account of the Society, and draw out exact lists of the members, with the sums contributed by each, and arrears due. He shall deliver to the Chairman of the Committee of Accounts, on the last day of January in every year, an account of the members who have paid in the preceding year, as likewise how many were elected, declined, or remained in arrear in that year. For all which services he shall be allowed one shilling in the pound on all such contributions, but not on legacies and particular donations. He shall attend all meetings and committees of the Society, and inform them of all matters necessary for them to know; for which he shall receive thirty pounds a year.

II. And whereas a Collector, with whose conduct the Society may be well satisfied, may happen to be unavoidably prevented, through sickness or accident, from performing

forming his duty, at a time when it may be prejudicial to the Society to have the collection delayed; or a Collector may have given such cause of dissatisfaction as to render his suspension expedient, and the time requisite for a proper examination into his conduct, before he may be either restored or justly removed, may occasion a prejudicial delay in the collection; the Society, to obviate these inconveniences, reserve to themselves the power of suspending in the latter case, a Collector, at any ordinary meeting when twenty members at the least are present; and upon confirmation of such suspension, of appointing, in either of the said cases, a temporary Collector, which appointment shall not require confirmation.

SECT. VII.

Meetings of the Society.

I. THERE shall be five General Meetings every year, in the Great Room of the Society, at seven of the clock in the evening precisely, viz. on the first Wednesday in February, the third Wednesday in April, the second Wednesday in May, the second Wednesday in November, and the second Wednesday in December; at which meetings, or at any extraordinary general meetings only, if fifteen members at least are present, rules and orders for the government of the Society may be made and altered; and such rules, orders, and alteration, being approved at the next succeeding general or extraordinary general meeeting, shall be valid and binding.

II. An Extraordinary General Meeting may be called, if twenty members, at the least, are present, and the majority shall desire such extraordinary general meeting; which

which extraordinary general meeting shall be advertised three days successively in two of the daily papers: And if fifteen members are present they may proceed to business.

III. No proposition shall be offered to the Society, as matter of new rule and order, or which shall contain in it an alteration or amendment, of any established rule and order, unless delivered in by a member, ten days before a general meeting of the Society, to the Secretary, who shall immediately cause copies to be made of it, and to be hung up in the Society and Committee Rooms, containing the date of the ensuing General Meeting when the same is to be taken into consideration. At the next general meeting, the Secretary shall, immediately after reading the minutes of the preceding meeting, read all such propositions once over, according to the order they have been delivered in; which propositions shall be read a second time, with a proper pause after each; and if any of those propositions be moved and seconded, it shall then be taken into consideration.

IV. All new rules and orders, once passed, are to be hung up in the Society's room till they are confirmed, with the date when passed the first time, and when to be confirmed.

V. All new rules and orders shall be signed by the President, or the Vice-President, and undersigned by the Secretary, and hung up in the Society-room and Committee-room, for the information of the members, till such time as they are inserted in their proper places in the subsequent printed book of rules and orders.

VI. The ordinary Meetings of the Society shall be held on Wednesday in every week, at seven of the clock in the evening

evening precisely, from the fourth Wednesday in October, to the first Wednesday in June; and from the first Wednesday in June to the fourth Wednesday in October, there shall be no meeting of the Society, unless called by the President, or two Vice-Presidents, on extraordinary occasions, and proper notice given thereof in the daily papers. And if at such ordinary meetings there should be present eleven or more members, they may proceed on business; but, in case there should not be eleven members present at seven o'clock, they may proceed on business with nine members only. And the said meetings shall have power to appoint such committees as they think necessary.

VII. An extraordinary meeting, for the doing of common business only, may be at any time ordered by the Society, in the same method as an extraordinary general meeting.

SECT. VIII.

Order of the Proceedings of the Society.

I. THE book of Rules and Orders, List of Premiums and of Members, shall lie upon the table before the President, or presiding member, at all meetings; and before the Chairman at all committees.

II. Each member is at liberty, before the President, Vice-President, or presiding member, takes the chair, to deliver to the Secretary, in writing, the names of no more than two persons whom he desires to be admitted auditors at that meeting; which names the Secretary shall enter in a list, together with the name of the proposer. The list shall be read as soon as the chair is taken; and, if not

objected to, the Collector shall carry the same to the Committee-room, and there call over the several names; when the persons allowed to be present may enter the Great-room, and seat themselves among the members, but shall not be permitted to debate or vote.

III. Persons desirous of being admitted auditors, are to remain in the Committee-room, until their names are called over by the Collector.

IV. No person to be admitted an auditor at any meeting of the Society, unless introduced by a member; nor shall any member propose an auditor to be admitted after the chair is taken.

V. No auditor to be admitted at the meetings of the Society but those who shall have obtained leave of the Society, or members of the Societies of the same kind in Scotland and Ireland.

VI. No member, whose subscription shall be beyond the current year in arrear, shall be at liberty to propose an auditor to be present at any meeting of the Society; and the Collector is directed to attend to this circumstance.

VII. At all meetings, business shall begin at seven o'clock in the evening with reading the minutes of the preceding meeting; but no part of such minutes shall be discussed till the whole has been read through.

VIII. Candidates shall be balloted for; and, during the ballot, the business of the evening shall be proceeded on.

IX. The minutes shall be read a second time; and no other matter shall be proposed till the said minutes have been discussed, article by article: and all parts of the minutes, which are not objected to at the second reading, shall stand confirmed.

X. The President, after the first reading of the minutes, is to declare, that every member is entitled to vote and assist in all the transactions of the Society and its Committees, unless his first subscription shall not have been paid; and that no member shall speak more than once on one and the same question, unless called upon from the chair to explain himself, excepting only the original proposer of any new motion, who shall be allowed the liberty of replying once on such occasion; and that no person is entitled to be present at any meeting or committee, whose subscription shall be at any time for two full years in arrear; and that no person shall be entitled to debate, or vote at any meeting or committee, until his subscription for the current year, and all arrears, are paid.

XI. Reports from committees shall be made; and the adjournment of those committees, which have not finished the business referred to them, shall be declared to the Society.

XII. All reports from the different committees shall be made to the Society in succession, according to their respective dates, unless when ordered otherwise by the Society.

XIII. A report from a committee, except in the case of a bounty, shall not be recommitted but by a majority of two-thirds.

XIV. The report from the Committee of Accompts is to be made between the first and second reading of the minutes, the next Wednesday succeeding the audit.

XV. New matter to be considered.

XVI. The President, or presiding member, shall then

read over to the Society the subjects the committees are to discuss the following days.

XVII. Letters to be read.

XVIII. No question shall be put on any motion unless the motion be seconded.

XIX. No motion shall be permitted for the repealing any confirmed resolution of the Society, till such resolution has been in force three months; nor shall any motion that has been rejected be made again, till after three months from the time of its rejection.

XX. No new proposition shall be entered upon after ten of the clock at night, unless the motion be read from the chair before ten o'clock.

XXI. No member, on any pretence whatsoever, shall be at liberty to move, that he may have leave to make a motion after ten of the clock.

XXII. No premium shall be offered to the public, unless it has been approved of by a committee, and agreed to by the Society, at one meeting, if the premium shall have been already published in the Society's Transactions; or at two meetings of the Society, if it be a new premium: and no premium or bounty shall be given to any candidate, unless the Society, at two meetings, shall be satisfied that such candidate does really deserve the same.

XXIII. When any proposal is made for a premium or reward, and the motion made and seconded, it shall be delivered to the chair in writing, and the same shall be read twice.

XXIV. No motion shall be made for the dispensing with any condition of a premium as offered in the advertisement, on any pretence whatever.

XXV. That no model, or machine, be, on any pretence whatever, lent, or suffered to be taken out of the Society's Repository, but by special vote of the Society, or, during the recess, by a resolution of the Committee of Correspondence and Papers.

XXVI. No proposition shall be carried into execution till it is approved and confirmed by the Society at two subsequent meetings; but, if a negative be put upon an affirmative proposition, or a negative proposition be agreed to, such decisions shall not require confirmation. But this article only applies to ordinary meetings.

XXVII. If, at the second reading of a proposition, any alteration shall be made by way of amendment, such alteration shall not want the confirmation of another meeting, unless the Society shall increase a premium, bounty, or any other expense; in which case it shall require the confirmation of another meeting.

XXVIII. No member shall be permitted to be on the area or space between the tables, while the Society is proceeding on business; nor shall any member stand up within the seats, unless it be to speak, or to go from or return to his place therein.

XXIX. When any member speaks he shall stand up and address himself to the chair, and the rest shall remain silent.

XXX. When two or more offer to speak together, the President, or presiding member, shall determine who shall speak first.

XXXI. The Member that speaks to order shall be first heard.

XXXII. When a matter is in debate, if any member

speaks to new business, the President, or presiding member, shall interrupt him; but the circumstance of the previous question being moved by any member during the debate on any motion, does not necessarily preclude the continuation of such debate.

XXXIII. When on any question an equal number of hands appear to be held up for and against the same, the President, or presiding member, shall appoint two members to count and report the numbers to the chair.

XXXIV. In all meetings and committees, the President, or presiding member, shall only vote when the suffrages are equal.

XXXV. The opinion of the Society shall be taken by ballot, instead of hands held up, if desired by five members.

XXXVI. A division shall not be granted but upon the request of six members.

XXXVII. No new matter, either respecting the government of the Society, or the measures for the improvement of arts, manufactures, and commerce, shall be received, unless it be laid before the Society in writing.

XXXVIII. At every meeting of the Society, all the resolutions of such meeting shall be taken down at large, and read aloud by the Assistant Secretary immediately after they have been respectively agreed to.

XXXIX. No meeting shall be adjourned until the majority of the members present, upon the question being put and seconded, shall agree thereto; nor shall the question be put until the names of the candidates proposed at such meeting have been read.

SECT. IX.

Order of Proceedings at a General or an Extraordinary General Meeting.

I. THE minutes of the preceding ordinary meeting shall be read.

II. The President, or presiding member, shall then declare the meeting to be a general or an extraordinary general meeting.

III. The minutes of the preceding general meeting shall be read the first time; and after a short pause shall be read a second time; when such parts as are not objected to shall stand confirmed.

IV. New matter relative to such meetings only may be proposed and discussed.

V. If, after a proper pause, no new matter is proposed, then the general or extraordinary general meeting shall be adjourned to the next general meeting in order; after which the usual business is to go on.

VI. Every proposition that is to be discussed at a general meeting, shall be publicly read by the Secretary, on the preceding Wednesday, immediately after the second reading of the minutes, and usual declaration from the chair.

SECT. X.

Election of Members.

I. No person is to be proposed for a member, unless recommended by three members; and the name, place of abode, and addition of the person recommended, shall be

delivered in, signed by the proposers, which shall be read by the Secretary, who shall insert the name in a list of candidates, to be hung up in the Society and anti-rooms, until the following ordinary meeting of the Society, at which such persons shall be balloted for, provided there be fourteeen days between the meetings: The names of the proposers, together with the name and addition of the person to be balloted for, shall be put upon the ticket, placed on the box, during the time of such ballot. The Collector, having a sufficient number of balls, shall give one to each, of the present balloting members, and, if two-thirds of the members then voting shall ballot in his favour, he shall be deemed a perpetual member, upon payment of twenty guineas at one payment; or a subscribing member, upon payment of any sum, not less than two guineas annually (BB). Peers of the realm, and Lords of Parliament, desirous of becoming members of this Society, shall on their being proposed at any meeting of the Society, be immediately balloted for. Ladies are eligible as members of this Society, are entitled to attend and vote in its proceedings and committees, and are alone entitled to vote by proxy on elections only, through the medium of some gentleman who is a member, but such member must produce a written authority from the lady for whom he votes as proxy.

II. In election of members, a second ballot shall be granted, if immediately demanded.

III. Every person, upon his election, is to pay his subscription-money, or one of the members is at liberty to make the deposit, in his name, in case of absence.

IV. Every member shall pay his subscription money in arrear

arrear within one month after he has been applied to by letter from the Collector for that purpose, according to the copy annexed, (C); and no person shall be entitled to debate or vote, at any meeting or committee, until his subscription for the current year, and all arrears, are paid: And no person shall be entitled to be present at any meeting, or committee, whose subscription shall be at any time for two full years in arrear: Yet as several, who have declined continuing their subscriptions for a time, may be again desirous of becoming members, but by the foregoing rule and order seem to be precluded until their arrears shall be discharged, it is hereby ordered, that any such person shall be capable of being re-elected a member of the Society, in the same manner, and on the same terms, as if he had never been a member before.

V. When any person is elected a member, the Secretary shall immediately inform him thereof by a letter (D); and the Collector shall wait upon him, if in town, and carry a printed book of rules and orders, and the list of premiums.

VI. The names of such persons as have not paid their first subscription money, are to be omitted in the list of members.

VII. Foreigners, or persons who do not reside in Great Britain, may be elected, by ballot, corresponding members of this Society, without being subject to any annual payment: and shall be admitted to the meetings and committees of the Society during their residence here, provided such residence does not exceed three months at one time; but shall not be permitted to vote.

VIII. On election of any person to be a corresponding member

member of this Society, a letter shall be written by the Secretary, acquainting him therewith; and the Secretary, in such letter, shall enclose him an exact copy of the standing rule and order, "That no member of this Society shall "hereafter be a candidate for, or entitled to receive any "premium, bounty, or reward, except the honorary me-"dals of the Society;" and also, that the Society request their corresponding members, as often as shall be convenient, to favour them with accounts of such useful discoveries or improvements in any of the polite or economical arts, as may come to their knowledge.

SECT XI.

Of Committees.

1. THE standing committees for the year shall be declared, and the members thereof shall be named by the Society, at eight o'clock, on the first Wednesday in April, and a general committee of election, to which the chairmen and members of the several committees shall be especially summoned, shall meet on the Friday next ensuing, to take into their consideration the choice of two chairmen to each of the several committees for the following year, and report their names to the Society on the second Wednesday in April, as proper persons to serve as chairmen in the respective committees, under the titles of which they shall be severally inserted, as follows:

Committee of Accounts.
Correspondence and Papers.
Agriculture.
Chemistry, Dyeing, and Mineralogy.
Polite and Liberal Arts.
Manufactures.

Manufactures.
Mechanics.
British Colonies and Trade.
Miscellaneous Matters.

And they are to report and recommend them to the Society as proper persons to be elected at their annual election of officers, to be held on the twenty-second day of the same month.

II. Nine committee minute books are to be kept; one for each of the above-mentioned committees.

III. Two chairmen shall be elected by ballot, for the Committee of Accounts, Committee for Miscellaneous Matters, Committee of Correspondence and Papers, and each class of the Committee of Premiums severally; who shall preside for that year when present, in the order they are named; and in case neither of the said chairmen should be present at their respective committees, any other member shall be appointed by the committee, chairman for the occasion.

IV. Committees shall not take up any matter, unless referred to them by the Society; and no decision on the merits of any question referred to the committee shall be made after eleven o'clock.

V. All committees shall be summoned, and the matters referred to them shall be specified in the respective summonses; and when any matter is referred to any of the committees of this Society, the mover thereof shall be summoned to attend such committee when the name is taken into consideration.

VI. All committees shall have power to adjourn themselves as they think fit; and, notwithstanding particular gentlemen

gentlemen are named for each committee, every member is of every committee.

VII. If a member shall signify to the Secretary his intention to attend any committee, he shall be summoned to it; and the Secretary shall be directed to summon such other members and other persons as the chairman apprehends to be most conversant in the business to come before them; which business also shall be declared in the summons; and three members shall constitute a committee.

VIII. In order that every member may be the better informed of the times of the meetings of the several committees, in general cases they are fixed in the following manner;

Committees of Correspondence and Agriculture, on Monday.
Colonies and Trade, and Manufactures, on Tuesday.
Mechanics, on Thursday.
Polite Arts, on Friday.
Chemistry, on Saturday.
Accounts, in the first week in every month.

IX. It is the duty of a chairman to observe, that no question be put to the committee unless three members are present; and before an adjournment of such committee, or report concluded, that the minutes be read, and signed by the chairman, who shall certify that three members at least were present. And the chairman is requested to attend the reports of the committee in which he presided, when such reports are made to the Society.

X. The chairman shall take care that regular meetings of the committee be appointed, and that their reports be made,

made, fairly written, and without blanks, so soon as any one or more of the subjects referred for their consideration have been disposed of; or when they may deem it requisite to gain further directions from the Society; but in case upon appointment of a committee, a sufficient number do not attend, the chairman is required to appoint another day, and shall direct the Secretary to summon the Committee on a future day, at a distance of not less than three days inclusive.

XI. There shall be constantly hung up in the Society's room and committee-room, a list of all committees, specifying the business they are to consider, and the days they are appointed to meet.

XII. No pecuniary or other reward shall be given to any candidate for a premium or bounty, for his trouble or attendance on any committee, to whom such matter shall be referred by the Society for their consideration, unless by order of the Society.

XIII. All references to the several committees shall be entered in the respective committee-books, in one list, at the beginning of such books, in order that the subjects of them may be regularly taken up.

XIV. Lists of reports that are ready to be made, or standing for confirmation, with their dates, shall always be hung up in the Great-room.

XV. Every committee shall direct the Secretary to write to one or more of the persons subscribing any certificate in claim of a premium in Great Britain, or to such other person as the committee may think proper, for further information of the truth of such certificate, and shall wait

wait for an answer as to the reality of their having signed the same, before the adjudication of such premium.

Provincial Committes.

That members of this society residing in manufacturing or commercial towns, or in the country at a distance from London, be recommended to form themselves into committees in their respective neighbourhoods.

Each committee to elect an honorary Secretary from amongst themselves, to correspond with the Secretary of the Society; and any communication which shall be received from the provincial committees will be attended to by the Society, and such as, in the opinion of the Society, shall contain information which may be useful to the Public, will be printed in the Society's transactions.

The Secretary of each of the provincial Committees to send to the Society an annual list of the names of the Members of such Committee.

The provincial Committees to furnish the Society with information respecting the claims for Premiums sent from their respective neighbourhoods.

The Society will provide the provincial committees with sufficient numbers of its rules and orders and lists of premiums for distribution, but reserves to itself the privilege of presenting sets of its transactions to provincial Committees, and of affording them such other privileges as may from time to time appear advisable to the Society.

The Society recommend to the attention of the provincial Committees, the several objects of the Society as detailed in its lists of premiums, and to propose to the

Society

Society any other premiums by which they think its beneficial influence may be extended, and to communicate any improvements which have been practised in their respective neighbourhoods. Their attention also is particularly invited to the natural and mineral productions of the country, and it is desirable they should transmit to the Society specimens of such as they think may be advantageously employed in any of the arts or manufactures of the country, and should they request to have information respecting them, such request will be attended to by the Society, and the specimens analyzed if necessary.

The provincial committees will likewise be expected to favour the Society with models or descriptions of any ingenious machines, or other new and useful inventions which may come to their knowledge, connected with the manufactures of the country; particularly such as shall be invented by any person, who from inadequacy of means may be unable to bring it before the public.

SECT. XII.

Of Rewards.

I. The chief object of the attention and encouragement of the Society, in the application of their rewards, are ingenuity in the several branches of the polite and liberal arts; useful inventions, discoveries or improvements in agriculture, manufactures, mechanics, and chemistry; or the laying open any such to the public; and in general all such useful inventions, discoveries, or improvements, as may appear to have a tendency to the advantage of trade and commerce.

II. The

II. The Society reserve to themselves the power of giving in all cases, such part only of any premium as the performance shall be judged to deserve, or reserving the whole if there be no merit.

III. The premiums of the Society shall extend to Great Britain and Ireland, and all the British Isles.

IV. No member of this Society shall be a candidate for or entitled to receive any premium, bounty, or reward whatsoever; except only the honorary medal of the Society. And no member having delivered in his claim for any premium offered by the Society, and afterwards withdrawn the same, shall be entitled to take a part in the deliberations, or vote on the claims of other candidates who may have claimed such premium.

V. No member who is a candidate for the honorary premium or medal of this Society, shall be of the committee to which such matter may be referred; or ever present at their sittings, while the subject is under consideration, unless called in to answer such questions as the committee may propose; nor shall any such candidate be present in the Society when the matter is before them, whether in debate, or for determination, unless called in. Which rules, all members being such candidates, are strictly to observe, under penalty of forfeiting their title to such medal, notwithstanding any determination of the Society in their favour.

VI. If any member shall be afterwards found to have transgressed the rules mentioned in the preceding resolutions, by the means of a borrowed or fictitious name, such member shall be expelled the Society.

VII. No

VII. No member, who is the father, son, or master of a candidate for a premium, bounty, or reward, nor any person anywise lucratively interested in such an event, shall be of the committee to which such matter is referred; nor present in the Society when it is under consideration, unless called in, under penalty of excluding such child, father, scholar, apprentice, or servant, from all title to any such premium, bounty, or reward, notwithstanding a determination of the Society in their favour.

VIII. A candidate for a premium, or person applying for a bounty, being detected in any disingenuous methods to impose on the Society, shall forfeit any such premium or bounty, and be deemed incapable of obtaining any for the future.

IX. No candidate who is not a member, shall be present at any of the meetings of the Society or committees, or admitted at the Society's rooms, after they have delivered in their claims, till such claims are adjudged, unless summoned by the committee, under forfeiture of the premium or bounty for which they are candidates.

X. No machine, or model of a machine, shall be admitted to claim a premium, unless the whole and every part thereof, shall be delivered into the Society's office at or before the time appointed by the Society. And if any candidate shall secretly make addition to, or alteration in his machine or model, otherwise than by repairing and putting the several parts together, after it is lodged with the Society, he shall on discovery be deemed incapable of receiving any premium.

XI. The Society shall, whenever they think proper, desire the assistance of such gentlemen, manufacturers, or others, though not members of it, as shall be deemed best

able to judge of, and discover the truth and value of any matter or thing for which a premium has been claimed.

XII. No medal, or sum of money, shall be given as a bounty or reward for any thing not mentioned in the list of premiums at any time, unless fifteen members are present; and the majority to bestow such medal or sum of money, shall consist of two-thirds at least of the members then present: the same to be confirmed by ballot.

XIII. If a claim for a premium shall be rejected by the Society, no motion shall be made for giving to the candidate, in lieu of such premium, any bounty of equal honour or value with the premium offered.

XIV. Every person who shall receive any premium or bounty from the Society, shall relinquish all pretensions to a patent for any matter for which he has obtained such premium or bounty. No model or machine for which a patent has been obtained, or is proposed to be obtained, shall be admitted into the repository of the Society.

XV. No member who has obtained a patent for any article similar to such as may be produced to the Society, shall be allowed to vote either in the committee or Society on that subject.

XVI. If any reward be conditionally voted by the Society, and the imposed conditions be not completed within one year from the time of such vote, the reward is to be considered as void, unless further time shall be granted by the Society for complying with the said conditions, in consequence of an application in writing made by or from the said claimant.

XVII. The several candidates and claimants to whom the Society shall adjudge premiums or bounties, are to attend

attend at the Society's house in the Adelphi, on the last Tuesday in May of that session, at eleven in the morning precisely, to receive the same; that day being appointed by the Society for the distribution of their rewards; and before that time no premium or bounty will be delivered, except to those who are about to leave the kingdom.

In cases where the Society may think fit to admit excuses for not attending in person, deputies may be substituted to receive the rewards, provided such deputies are either members of the Society, or superior officers thereof.

At the annual distribution of the Society's Rewards, no member shall be at liberty to give tickets for the admission of more than two ladies and one gentleman, as auditors at the distribution of premiums.

The tickets to be issued from the Secretary's office, and signed by the member who gives them; and not more than one individual to be permitted to attend as a visitor on that day for each order or ticket of admission.

XVIII. That the Isis Medal be considered and called the Lesser Medal of the Society.

SECT. XIII.

Resolutions.

I. THAT all models of machines, for which persons obtain premiums or bounties, shall become the property of the Society, and correct written descriptions be furnished with them; and where machines are rewarded, that complete models, or correct drawings, and proper written explanations, be delivered to the Society by the persons entitled to such rewards.

II. All the written accounts, for which any premium is offered and given, or for which the Society have given a bounty, shall be published; such accounts being first referred to a committee to prepare them for publication.

III. With the list of premiums, an account of all the medals, premiums, and bounties, which have been given by the Society the preceding year, to whom and for what purposes, shall be printed annually.

IV. In the list of the members, after the name of each member, his addition and place of abode are to be inserted.

V. The committee of correspondence are at liberty from time to time, to refer such letters as they esteem proper to the respective committees, without reporting them to the Society, in order to be referred to such committee; except such as propose the granting any new premium or bounty.

VI. All the books of the proceedings, correspondence, &c. of the Society, shall be kept in the Society's office to be inspected by members at any reasonable hour; the housekeeper having for that end a key of the presses.

VII. Members wishing to obtain copies of papers belonging to the Society, shall give a list of such papers as they want, which lists shall be read by the Secretary.

VIII. That no book be purchased for the library of the Society, until it has been recommended by the committee most competent to judge of its merits and usefulness.

IX. No member is to be permitted to borrow from the library more than either one folio, one quarto, or two octavo or 12mo. volumes at one time, but that this liberty shall not be construed to extend to manuscripts, the transactions of literary and other politic bodies, lexicons,

or

or dictionaries, which shall on no account be lent out of the library, unless by special vote of the Society.

No member is to be permitted to keep any book longer than fourteen days.

A book is to be provided by the housekeeper, in which the titles of the books borrowed, with the names of the person borrowing the same, shall be inserted by the member who borrows such books, and when they are returned, countersigned by the housekeeper.

That such book of the housekeeper be laid before the chairman of the Miscellaneous Committee at every meeting thereof, in order that it may be seen that the above regulations be properly attended to.

X. No person shall be permitted to make any sketches, finished drawings, or paintings, from any statues, busts, casts, drawings, prints, or pictures in the Society's possession, without leave first obtained from the Society.

XI. That the Society do not, under the notion of varnishing, touching, or on any account whatever, suffer any painter to meddle with the series of pictures in the Great-room.

XII. That for the better regulation of the dealings of the Society with tradesmen and others, all persons having any claims on the Society, be in future directed to send in an account of their demands once in every three months from the time of their accruing; and the committee of accounts shall at their next monthly meeting inspect such demands, and report upon them to the Society, when the bills recommended for payment, upon such recommendation being confirmed by the Society, shall be discharged at the ensuing monthly meeting of that committee, by the

joint drafts of the chairmen on the Bank of England, or by part of the money remaining in the Collector's hands, as the said committee or either of its chairmen shall direct.

N. B. To persons inclinable to leave a sum of money to this Society by will, the following form is offered for that purpose:

ITEM, I give and bequeath unto A B and C D, the sum of upon condition, and to the intent, that they or one of them, do pay the same to the collector, for the time being, of a Society in London, who now call themselves *The Society for the Encouragement of Arts, Manufactures, and Commerce;* which said sum of I will and desire may be paid out of my personal estate, and applied towards carrying on the laudable designs of the said Society.

(A)

BALLOTING LIST.

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PRESIDENT.

Charles, Duke of Norfolk, F.R. and A.S.

VICE PRESIDENTS.

John, Duke of Bedford, F.A.S.
Hugh, Duke of Northumberland, F.R. and A.S.
G. G. L. Marquis of Stafford, K.G.
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Robert, Earl of Liverpool, F.R.S.
Charles, Earl of Romney, F.R.S.
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HOUSEKEEPER, Miss A.B. Cockings.
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SECRETARY,
ASSISTANT SECRETARY,
HOUSEKEEPER,
COLLECTOR.

PAPERS related to

(289)

(B) BALLOTING LIST.

PRESENT CHAIRMEN.

Committee of Accounts.	Committee of Accounts.
Correspondence and Papers.	Correspondence and Papers.
Polite Arts.	Polite Arts.
Agriculture.	Agriculture.
Manufactures.	Manufactures.
Mechanics.	Mechanics.
Chemistry.	Chemistry.
Colonies and Trade.	Colonies and Trade.
Miscellaneous Matters.	Miscellaneous Matters.

(BB)

No. 18

RECEIVED of
the sum of being his
contribution to the *Society for the Encouragement of Arts, Manufactures, and Commerce*, for one year from

£. VICE-PRESIDENT.

No. 18

RECEIVED of
the sum of being his
life contribution to the *Society for the Encouragement of Arts, Manufactures, and Commerce.*

£. VICE-PRESIDENT.

SIR, (C)

I AM directed to inform you, that your annual subscription of has been in arrear since the day of and as it is of consequence for the Society to know what sums of money they can bestow in premiums, you are requested to order the payment of it.

By order of the Society,
COLLECTOR.

(D)

SIR,

I HAVE the honor to acquaint you, that on this day you were elected a Member of the *Society for the Encouragement of Arts, Manufactures, and Commerce*; and as, by their Rules and Orders, every person on his election is to pay his subscription-money, and is not confirmed a member till such subscription be paid, you are requested to order the said payment to be made to the Collector.

I am Sir, your very humble Servant,

ADELPHI, SECRETARY.
Dec. 30th, 1815.

Printed by Order,

CHARLES TAYLOR, M.D. SEC.

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AGRICULTURE. CLASS I.

No.

CXXV. VARIOUS Sheers, or pruning Implements, from Mr. James Ogden. See page 40.

CXXVI. An useful Apparatus to prevent vicious Bulls from doing mischief, from H. J. Nicholls, Esq. See page 42.

CXXVII. An Apparatus for drying Beans or Seeds in bad Seasons, from Mr. W. Bowler. See page 47.

CHEMISTRY. Class II.

A Drawing of Machinery, for extracting Cocoa Nut Oil, from Thomas Hoblyn, Esq. See page 60.

MANU-

MANUFACTURES. Class III.

LXI. Model of a Machine for serving Ships' Ropes, from Mr. Edwin Jones. See p. 87.

LXII. Model of a Machine for smoothing Straw Hats, from Mr. Scorrar. See page 90.

MECHANICS. Class IV.

CCCLVII. Various curious Surgical Instruments, from the Chevalier Assalini. See page 93.

CCCLVIII. An improved Abscess Lancet, from Mr. Heslop. See page 112.

CCCLIX. A Model of a double Piston Pump, from Mr. W. Franklin. See page 115.

CCCLX. A Model of a Telegraph, from Mr. A. Law. See page 118.

CCCLXI. A screw Apparatus, for securing Ship's Guns, from Mr. A. Law. See page 122.

CCCLXII. An Instrument for examining the State of Ships' Bottoms at Sea, from Mr. J. Buck. See page 124.

CCCLXIII. A Model of a Method of easing the Centre of Arches without danger, from Mr. R. Williams. See page 127.

CCCLXIV. Sketches of Methods to prevent the Accumulation of Soot in Chimnies or Flues, from Rev. Mr. Ridge. See page 131.

A Model

CCCLXV. A Model of a Drag for Carriages going down Hill, from Mr. T. Rapson. See page

CCCLXVI. Hobbles for casting or laying Horses down, from Mr. Bracy Clark. See page 140.

CCCLXVII. A double Door Spring, from Mr. J. Barrow. See page 146.

CCCLXVIII. A single Door Spring, from Mr. J. Barrow. See page 148.

CCCLXIX. A Domestic Balance or Weighing Machine, from Mr. J. Braby. See page 150.

POLITE ARTS. Class V.

XXV. A new Centro-lineal, from Mr. Peter Nicholson. See page 71.

XXVI. A cheap and portable Easel for Painters, from Mr. C. Varley. See page 82.

XXVII. A Protractor for Drawing, from Mr. H. Fulton. See page 84.

COLONIES AND TRADE.

II. An Hydrometer, for saline Liquors. See page 153.

III. Calooee Hemp from the East India Company. See page 184.

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TO THE

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FOR THE

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Extended to December 1st, 1815.

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P Zenobio, Right Hon. Count Alvise

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Rogerson, Dr. John, *St. Petersburgh*
Rush, Dr. Benjamin, *Philadelphia*
Dancer, Thomas, M.D. *Superintendant of the Botanic Garden, Jamaia*
Chevalier de Souza, *Portugal*
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Mac Rea, Alexander, Esq. *Demarara*
La Terriere, M.D. *Quebec*
Assalini, Chevalier, *Milan*

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Printed by R. Wilks, 89, Chancery-lane, London.

TRANSACTIONS

OF THE

SOCIETY

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES, & COMMERCE.

Charles Duke of Norfolk.

F.R.& A.S. &c.

Late President of the Society

for the Encouragement of Arts, Manufactures and Commerce.

Engraved by Chas Warren, from a Picture by J. Lonsdale,

in the Possession of His Grace the Duke of Norfolk

TRANSACTIONS

OF THE

SOCIETY,

INSTITUTED AT LONDON,

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES, AND COMMERCE;

WITH THE

Premiums offered in the Year 1816.

VOL. XXXIV.

LONDON:

PRINTED BY R. WILKS, CHANCERY-LANE.

Sold by the HOUSEKEEPER, at the SOCIETY'S HOUSE, in the ADELPHI; and by Messrs. J. WHITE, BECKET, HUNTER, CADELL and DAVIES, PHILLIPS, WALTER, RICHARDSON, LONGMAN and REES, NORMANVILLE & FELL, TAYLOR, and T. WOODFALL, 14, Sloane Street, Chelsea.

[Price TEN SHILLINGS AND SIXPENCE.]

MDCCCXVII.

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PREFACE.

SINCE the publication of the last volume of Transactions, the Society has been deprived, by death, of that personage, (the first in rank, after the blood royal, of the British Nobility,) who, during the long series of twenty-two years, has held the office of PRESIDENT in this Society. As a testimony of respect for his memory, a portrait of this Nobleman is prefixed to the present volume. The chair which had thus become vacant, has been filled by an illustrious Member of our Royal Family, who, in accepting the Presidency, has thus given a public pledge that the Encouragement of the ARTS, COMMERCE, and MANUFACTURES of the country, does not misbecome the highest patronage; who is sensible, that, in personally distributing the Medals and other honorary rewards given to merit, often in the lower ranks of life, he is thus superadding to the direct encouragement conferred by the vote of the Society, that collateral and in many cases equally satisfactory gratification, arising from the high rank of the personage through whose hands the reward is immediately received.

Not only the highest official situation in this Society, but also the most effective one, namely, the Secretaryship, has, by the common lot of human nature, become recently vacant. Exhausted by a long and painful disorder, but preserving to the last his unintermitting zeal for the welfare of the Society, Dr. CHARLES TAYLOR has closed his services, and only lives in the regrets and grateful recollections of his friends. Those who had the best opportunities of knowing him are the best qualified duly to appreciate his entire devotedness to the Society during the sixteen years of his connection with it. His official duty had become his ruling passion, his pride, and his delight. May his successor acquire equal claims to the support and respect of the Society.

The ENGRAVINGS, in illustration of the subjects treated of in the present volume, are numerous and of distinguished merit; entirely worthy of the place which they hold in the Transactions of a Society, one of the leading objects of which is the Encouragement of the FINE ARTS.

On the national subject of raising oak timber, her Grace the DUCHESS of RUTLAND has communicated some very important information. It appears from experiments on a large scale, made under the direction of her Grace, that the most advantageons method of cultivating oaks, (whether the acorns are sown at once on the ground they are intended to occupy,

or

or the more usual way of planting seedlings be adopted,) is to cultivate the ground between them in order to keep down the growth of weeds. For this purpose, no crop has been found so advantageous as potatoes, which are to be continued on the ground, year after year, till the trees themselves have grown sufficiently to become, without further assistance, a smothering crop. It appears, also, that the intermixture of other kinds of trees is decidedly injurious to the progress of the oaks, which are very liable to be overgrown and stifled by the vicinity of trees which make more rapid progress than themselves.

Plantations of forest-trees of considerable extent have also been made by WM. CONGREVE, Esq.; by WM. MEEK, Esq.; and by BACHE THORNHILL, Esq.; to all of whom Medals have been awarded.

For a very important communication in another department of rural œconomy, the Society has adjudged a Gold Medal to JOHN CHRISTIAN CURWEN, Esq. V.P. This gentleman, to the publication of whose successful practice in agriculture the country is already much indebted, has, in the present paper, exhibited the particulars of a completely successful experiment, showing the œconomy and practicability of stall-feeding cattle from a very early age. By means of clover, turnips, straw, and steamed chaff, with scarcely any hay

hay, thirty-three calves have been reared without any casualty, several of them at a year old weighing between sixty and seventy stone

J. S. HALL, Esq. has communicated the successful result of his method of protecting nearly 1200 Merino sheep from the inclemencies of our fickle climate.

In the Class of CHEMISTRY, Mr. G. FIELD's Filtering Apparatus, and his Stove for drying by a gentle heat and a quick circulation of air, will, no doubt, be properly esteemed by those manufacturers who are in the habit of preparing coloured lakes and other delicate pigments.

Mr. RYAN's paper, describing his new method of ventilating collieries, is earnestly recommended to the notice of the proprietors and superintendants of these most useful and important of all mines; but which, in the way they have hitherto been worked, have demanded a prodigal expenditure of human life. The degree of success which has hitherto attended Mr. RYAN's practice is a complete justification, in the opinion of the Society, of the liberal reward which they have bestowed on the inventor; and their earnest wish is, that Mr. R. may have an opportunity of bringing to the fair test of experiment his entire system.

The

The Medal awarded to Dr. CLANNY for his Safety Lamp, is due to him, not only for the practical merit of his invention, but for the perseverance with which, for many years, and under many discouragements, he has laboured with unwearied and disinterested humanity in diminishing the hazard attendant on mining operations in the coal districts.

In the Class of POLITE ARTS, Mr. C. PYE's preparation of charcoal, whereby it is made to answer the purpose of black chalk for drawing, Mr. WM. CUBITT's invention of an instrument for drawing Ellipses; Mr. C. WEST's improved Parallel Rule; Mr. E. TURRELL's new Drawing-Board and T. square; Mr. ALLASON's instrument for representing natural Objects in true Perspective; and Mr. THOS. BARBER's Angulometer for laying down and measuring Angles, will, it is hoped, facilitate the work of the artist and contribute, in their several departments, to that accuracy and precision of execution by which the present race of artists are so remarkably distinguished even from their immediate predecessors.

In the Class of MANUFACTURES, the Communications of Mr. BUCK and of Mr. FLOWER are interesting, as showing that real Merino wool of English growth is beginning to supply our domestic manufactures of superfine cloth.

Mr.

Mr. SCHORRAR's machine for blocking straw-hats has the merit of expediting the process, and therefore of diminishing the expence in a manufacture which has grown up in a single generation to an object of even national importance.

In the Class of MECHANICS, Sir HOME POPHAM's Telegraph and Marine Vocabulary; and the Rev. JAMES BREMNER's Day and Night Telegraphs will, in various ways, contribute to the improvement of that curious and interesting art, by which verbal communications are transmitted from place to place with a rapidity which only a few years ago would have been considered as wholly impracticable.

Lieut. SHULDHAM, of the Royal Navy, has made an improvement in the construction of Blocks and Pullies; and, by a very simple contrivance, has added greatly to the working power of the Capstan.

The late MAJOR LE HARDY has invented an apparatus for effecting with more certainty and precision than heretofore, a communication between stranded vessels and the shore.

To Mr. J. DICKSON the public are indebted for a simple and speedy method of raising and lowering the propelling-wheels

wheels of steam-boats; and Mr. T. PERRING has constructed a set of tables for the expeditious correction of the observed longitude, and the deduction from days' works at sea of the dead reckoning.

Mr. JAMES ALLAN's Theodolite, and his method of making accurate screws for mathematical purposes, not only do him credit as a practical artist, but will contribute to the further improvement of the art itself;—that beautiful and important art, the construction of instruments for the mensuration of space whether terrestrial or celestial, without which the sublime edifice of modern astronomy could scarcely have been founded.

The difficulties often experienced by the surgeon in conveying ligatures round deeply seated arteries, and in extirpating polypi, have induced Mr. WM. BREMNER to invent instruments for that purpose, which the Society has rewarded, in the hope that they will prove effectual.

The mortality and disease attendant on those employed in pointing Needles, arising partly from accidents but principally from inhalation of the fine dust produced in this part of the process, have long engaged the attention of the Society. The machine invented by Mr. THOMAS ROBARTS, of Dumfries, with the design of obviating the sacrifice of human

man life in this necessary manufacture, though perhaps not perfect, is certainly calculated greatly to diminish the danger of the employment.

Dr. CARTWRIGHT's Traversing Apparatus, whereby the usual circular motion of a horse in working a mill is exchanged for a rectilinear course; and the CHEVALIER BAADER's circular Motion, applied to raising water, will add to the resources of the practical engineer.

Mr. T. PERRY's Instantaneous Calculator is an ingenious and useful application of the known principles of mechanical calculation, as exemplified in sliding rules, &c. to tables of interest, &c.

Mr. BRABY's fire escape, Mr. PARKER's door spring, and Mr. GOODWIN's probang, complete the list of articles in the Class of Mechanics, and appear well calculated to answer their respective objects.

In the Class of COLONIES AND TRADE, Mr. HOBLYN's Rice-Mill is a well constructed engine, which has already produced a most beneficial effect on the culture of this important article of human food in the island of Ceylon, and will, no doubt, be extensively adopted in our other East India Settlements.

LT.

Lt. Col. Bouchette's Map of Canada does credit to his abilities as a surveyor, and is a public pledge of his being duly qualified for the office to which he has recently been appointed by his Majesty's Government.

The Society take the present opportunity of returning their thanks to the different public bodies and individuals who have honoured them with presents during the Session, the particulars of which are noticed near the close of the present Volume. Without presuming to direct in what channels the liberality of the friends to this institution shall flow, it may be stated, that such contributions as may put the Society in possession of a complete collection of all the publications of any value on the application of mathematics to practical mechanics will be especially acceptable.

The Society desire it to be clearly understood, that, as a Body, they are not responsible for any opinion or representation of Facts contained in the following pages.

---

110. For the best copy of a landscape, by persons of either sex, under the age of eighteen; the silver Isis medal.

111. For the best original painting or drawing of fruit or flowers, by persons of either sex, under the age of twenty-one; the silver medal.

112. For the best finished drawing of the statue of the Venus, No. 8, Room 2, or Ceres, No. 52, Room 6, in the British Museum; the size of the drawing not less than eighteen inches high, by persons of either sex, under the age of twenty-one; the silver medal.

113. For the best drawing of the head of Homer, marked No. 33, in the British Museum, not less than twelve inches in height, by persons of either sex, under the age of 21; the silver Isis medal.

114. DRAWINGS OF OUTLINES.

For the best outline, after the plaster cast of the Apollo Belvidere, by persons of either sex, under the age of 21, the figure not less than eighteen inches; the silver medal.

115. For the best perspective drawing of machines, by persons of either sex, under the age of twenty-one; the silver medal.

116. For the best original painting or drawing, not included in either of the above mentioned classes, by persons of either sex, under the age of twenty-five; the gold Isis medal.

117. For the best copy, as above, by persons under the age of twenty-one; the silver Isis medal.

118. ARCHITECTURAL DESIGNS.

For the best original design of a triumphal arch, or other design forming a principal entrance to a city, consisting of plan, elevation, and section, each to be the size of double elephant; the drawing to remain the property of the Society; the gold medallion.

For the next in merit, the silver medallion, on similar conditions.

The following inscriptions to be engraved on these medallions; *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, Esq. of Hampstead.*

119. PLASTER CAST.

For the best original model of a group, not less than three figures, by persons under twenty-five; the gold medal.

For the next in merit, the gold Isis medal.

120. For a single figure, by persons under twenty-one, the silver medal.

*** A cast from the model in each case to remain the property of the Society, if required.

121. ETCHING OF AN HISTORICAL SUBJECT.

For the best free etching in historical composition, from a picture of eminence; the gold Isis medal.

122. ETCHING OF A LANDSCAPE.

For the best free etching in landscape composition, from a picture of eminence; the silver medal.

123. HISTORICAL ENGRAVING.

For the best finished engraving in historical composition; the gold medal.

124. LANDSCAPE ENGRAVING.

For the best finished engraving in landscape composition; the gold Isis medal.

125. ENGRAVING OF A PORTRAIT.

For the best finished engraving of a portrait, the gold Isis medal.

N. B. In the class of finished engravings the Society require an aqua-fortis impression, and a finished proof to be sent, and to remain with the Society.

126. ENGRAVING ON WOOD BLOCKS.

For the best engraving on wood blocks of an historical subject, the size of the principal figure not less than six inches in height, and the block to be at least twelve inches by nine; the gold Isis medal.

Two or more impressions, with the block, to be produced to the Society. The impressions, but not the block, to remain the property of the Society.

127. MEDAL DIE ENGRAVING.

For the best die engraving, either of a single figure or group, after the engraver's own design and model; the gold medal.

128. For the best die engraving of a design appropriate to the Society's rewards, in the classes either of Mechanics, Chymistry, or Colonies and Trade. The size of the die not to exceed two inches; the gold medal.

The dies, with two impressions or casts, and the model, in each claim for Medal die sinking, are to be produced to the Society, and the impressions or casts to remain the property of the Society, but the dies to be returned, unless the Society should purchase them.

CONDITIONS,

FOR THE POLITE ARTS.

All articles in the class of Polite Arts, whether for claims or bounties, are to be produced to the Society on or before the

Tuesday in March, 1817, and none can be received after that day.

No person who has gained the first premium in any class shall be admitted a candidate in a class of inferior age; and no candidate shall receive more than one premium in one year.

No more than one performance in any class shall be received from the same candidate.

All performances (to which premiums or bounties are adjudged) shall remain with the Society until after the first Wednesday in June, 1816, when they will be re-delivered, unless mentioned in the Premiums to the contrary.

No performance shall be admitted, that has obtained a reward from any other society, or academy, or been offered for that purpose.

It is required, that the subjects for which premiums are offered, be delivered in without the names, or any external intimation to whom they belong; that each particular subject be marked in what manner the claimant thinks fit, such claimant sending with it a paper sealed up, having on the outside a corresponding mark, with the number of the class in which it is meant that the claim should be made, and on the inside the claimant's name, residence, and age; the name not to be disclosed, unless the candidate be successful, or by a special vote of the Society. No production can be received with a view to obtain a bounty, which could have come into any of the foregoing classes.

To encourage real merit, and prevent attempts to impose on the Society, by producing drawings made or retouched by any other person than the candidate, the Society require a specimen of the abilities of each successful candidate, to be made under the inspection of the Committee of Polite Arts.

All candidates in the Polite Arts are required to signify, on their drawings, whether the performances are originals or copies; and if possible to send the originals from which copies are taken.

All copies of drawings, &c. are to be on a different scale from the original.

The Society reserve to themselves the power of giving in all cases such part only of any premium as the performance shall be judged to deserve; or withholding the whole, if there be no merit.

PREMIUMS FOR ENCOURAGING AND IMPROVING MANUFACTURES.

129. EMPLOYMENT OF FEMALES.

To the person who shall instruct and employ the greatest number of females, not fewer than twenty, in the making of men's clothes, particularly of woollen cloth, and not being for the use of the army or navy; the gold medal, or fifty guineas.

Certificates that the number of women above mentioned, have been constantly so employed for at least three months, to be produced to the Society, on or before the last Tuesday in March, 1817.

130. For the next greatest number of women so employed, not fewer than ten; the silver medal, or fifteen guineas, on similar conditions.

131. CLOTH FROM HOP-STALKS, NETTLES, &c.

To the person who shall produce to the Society the greatest quantity, not less than thirty yards of cloth, at least 27 inches wide, made in Great Britain or Ireland, of hop-stalks or bines, nettles, or other raw vegetable substances, the produce of Great Britain or Ireland, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as cloth of equal quality and appearance now made from hemp, flax, or cotton, and much finer in quality than any hitherto manufactured in England from hop-stalks, &c.; the gold medal, or thirty guineas.

One pound of the thread of which the cloth is made, and thirty yards of the cloth, together with proper *certificates* that the whole is manufactured from hop-stalks, or bines, &c. to be produced to the Society on or before the last Tuesday in December, 1816.

N. B. The Society is already in the possession of cloth made in England from hop-stalks or bines, and nettles, which may be inspected by application to the Housekeeper.

132. SHEEP'S WOOL.

To the person who shall prove to the Society, that he has sold the largest quantity of Merino wool, or such wool as will an-

swer the same purposes, being the produce of his own flock, in the United Kingdom, for the purpose of being manufactured in superfine cloth, the quantity of wool not less than five hundred weight, in the year 1816; the gold medal.

Certificates, along with samples of the wool, and of the cloth manufactured from it, to be produced to the Society on or before the last Tuesday in March, 1817.

133. For the next greatest quantity, not less than two hundred and fifty pounds; the silver medal, on similar conditions.

134. HOGS BRISTLES.

To the person who shall prepare the greatest quantity of bristles, from swine bred in the United Kingdom, equal in quality to those imported from Russia or Prussia, and at as cheap a rate; the silver medal, or fifteen guineas.

Certificates, that not less than one hundred weight have been so prepared, and a sample of not less than fourteen pounds of such bristles, to be produced to the Society on or before the last Tuesday in February, 1817.

135. WICKS FOR CANDLES OR LAMPS.

To the person who shall discover to the Society, a method of manufacturing hop-stalks or bines, nettles, or any other cheap material, the growth of Great Britain, so as to render them equally fit for the purpose of supplying the place of cotton, for wicks of candles or lamps; the silver medal, or twenty guineas.

Samples, not less than five pounds weight, of the wick so prepared, to be produced to the Society on or before the last Tuesday in December, 1816, with *certificates* that the whole quantity is equal in quality to the sample.

136. EXPERIMENTS TO ASCERTAIN THE PROPER THICKNESS OF WICKS FOR CANDLES.

To the person who shall make known to the Society the most satisfactory result of a series of experiments actually made by him to determine the best thickness of cotton wicks for candles, so as to obviate the defects of those commonly used; the silver medal, or ten guineas.

Certificates that not less than one hundred weight have been so made, and six pounds of the candles, to be produced to the Society, on or before the last Tuesday in February, 1817.

N.B. The intention in offering this premium, is to ascertain the proper thickness or bulk of the wick in proportion to that of the tallow, and to remove the unpleasant consequences and waste arising from the sparkling, or guttering of the candles in common use.

137. PAPER FROM RAW VEGETABLE SUBSTANCES.

To the person who shall, between the first of January, 1816, and the first of January, 1817, make the greatest quantity, and of the best quality, (not less than ten reams) of good and useful paper, from raw vegetable substances, the produce of Great Britain or Ireland, of which one hundred weight has not been used in manufacturing paper previous to January, 1815, superior to any hitherto manufactured from such substances, and which can be generally afforded, as cheap as paper of equal quality and appearance now made from rags; the silver medal, or twenty guineas.

N.B. The object of the Society being to add to the number and quantity of raw materials used in this manufacture, it is their wish to include every useful sort of paper, and to introduce such natural products as can be easily and cheaply procured in great quantities. The Society are in possession of two volumes containing a great variety of specimens of paper made from raw vegetable substances, viz. nettles, potato-haulm, poplar, hop-bines, &c. which volumes may be inspected by any person on application to the Housekeeper.

Certificates of the making such paper, and one ream of the paper, to be produced on or before the second Tuesday in January, 1817.

138. TRANSPARENT PAPER.

To the person who shall discover to the Society a method of making paper from the pulp, that shall be perfectly transparent, and of a substance and body equal to foolscap, that shall take and bear common writing-ink with the same facility and correctness as writing-paper generally in use; the silver medal, or twenty guineas.

Certificates of the making such paper, an *account* of the process, and one ream of the paper, to be produced on or before the second Tuesday in January, 1817.

139. CHINTZ PATTERNS FOR CALICO-PRINTERS.

For the best original pattern in a new taste, of light and dark-ground chintz for garment work, or furniture, fit for the purpose of calico-printers, by persons of either sex; the silver medal. The pattern for which the premium is adjudged, to remain the property of the Society.

140. COPPER-PLATE PATTERNS FOR CALICO-PRINTERS.

For the best pattern, in a new style, fit for the purpose of calico-printers for garment-work or furniture; the silver medal. The pattern for which the premium is ad-

judged, to remain the property of the Society.

N.B. The patterns to be produced on or before the last Tuesday in February, 1817.

141. GLOVES EQUAL TO FRENCH KID.

To the person who shall make known to the Society, a process equal to that of the French, or a superior one, for preparing, dying, and finishing the skins, verified by actual experiments, and the communication accompanied with at least a dozen pair of gloves made from skins so prepared in an equal or superior manner; the gold medal, or forty guineas.

Certificates from competent persons, fully approving of the result of such experiments, together with the gloves and communication, to be produced to the Society on or before the last Tuesday in March, 1817.

142. IMPROVED CAT-GUT EQUAL TO ROMAN OR ITALIAN.

To the person who shall discover to the Society the best method of manufacturing, in the United Kingdom of Great Britain and Ireland, the intestines of sheep, lambs, goats, or of any other animals, into the article called cat-gut, equally strong, clear, smooth, even, and free from knots, as the best Italian strings, and at a price not exceeding what they are usually sold for in England; the gold medal, or thirty guineas.

Certificates that not less than fifty pounds weight have been so prepared by the claimant, with a full detail of the process, and samples of the articles of various thicknesses, to be produced to the Society on or before the first Tuesday in February, 1817.

143. For the next greatest quantity, not less than twenty-five pounds; the silver medal, or twenty guineas, on similar conditions.

PREMIUMS IN MECHANICS.

144. GUNPOWDER MILLS.

To the person who, in the year 1816, shall invent and bring to perfection the most effectual method of so conducting the works of gunpowder mills in the business of making gunpowder, as to prevent explosion; the gold medal, or one hundred guineas.

Certificates and *accounts* of the method having been put in practice in one or more gunpowder mills in this kingdom, and that it promises, in the opinion of the best judges concerned in such works, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in Feb. 1817.

N.B. As an encouragement to persons to turn their thoughts to improvements of this nature, if any should be made on the present method of conducting the business of gunpowder making, which fall short of the total prevention of explosion, and they are sent to the Society for the sake of humanity, the papers so sent in will receive due consideration; and such bounty or reward will be bestowed as they may appear to merit.

145. TRANSIT INSTRUMENTS.

To the person who shall invent and produce to the Society a cheap and portable transit instrument which may easily be converted into a zenith sector, capable of being accurately and expeditiously adjusted for the purpose of finding the latitudes and longitudes of places, and superior to any portable transit instrument now in use; the gold medal, or forty guineas.

To be produced on or before the last Tuesday in January, 1817.

146. TAKING WHALES BY THE GUN-HARPOON.

To the person who, in the year 1816, shall strike the greatest number of whales, not fewer than three, with the gun-harpoon; ten guineas.

Certificates of the striking such whales, and that they were actually taken in the year 1816, signed by the master, or by the mate when the claim is made by the master, to be produced to the Society on or before the last Tuesday in December, 1816.

147. *This Premium is extended one year further, on similar conditions.*

148. FAMILY MILL.

To the person who shall invent and produce to the Society the best constructed mill for grinding corn for the use of private families, or parish poor; the construction to be such as to render the working of the mill easy and expeditious, and superior to any hitherto in use; the gold medal or thirty guineas.

The mill, and *certificates* of its having been used to good effect, to be produced to the Society on or before the first Tuesday

in February, 1817. Cheapness and simplicity will be considered as essential parts of its merit; and the mill, or a model, to remain with the Society.

149. A PORTABLE MILL FOR GRINDING CORN.

To the person who shall invent and produce to the Society a portable corn mill, superior to any now in use; the gold Isis medal, or thirty guineas.

The mill, and *certificates* of its efficacy from actual use, to be produced to the Society on or before the last Tuesday in February, 1817.

150. A PORTABLE OVEN.

To the person who shall invent and produce to the Society a portable oven, superior to any hitherto in use; the silver medal, or twenty guineas.

The oven, with *certificates* that it has been found to answer in use, to be produced to the Society on or before the last Tuesday in February, 1817.

151. MACHINE FOR RAISING COALS, ORE, &c. &c.

To the person who shall invent a machine for raising coals, ore, &c. from mines, superior to any hitherto known or in use; and which shall produce the effect at a less expense than those already known or in use; the gold medal, or fifty guineas.

A model of the machine, made on a scale of not less than one inch to a foot, with a *certificate* that a machine at large on the same construction has been advantageously used, to be produced to the Society on or before the second Tuesday in Feb. 1817.

152. IMPROVED WALKING-WHEEL, OR CRANE.

To the person who shall invent an improved walking-wheel or crane, on which the weight or power of any person or persons shall be applied with the greatest safety and effect, and so contrived that the power can be varied according to the greater or less weight to be raised or lowered; the gold medal, or thirty guineas.

The model on a scale of not less than one inch to a foot, with a proper *certificate* that the machine at large has been employed to good effect, to be produced to the Society on or before the second Tuesday in February, 1817.

153. MACHINE FOR RAISING WATER.

To the person who shall invent a machine on a better, cheaper, and more simple construction than any hitherto known or in use for raising water out of wells, &c. from a depth of not less than fifty feet; the gold medal, or thirty guineas.

Certificates of the performance of the machine, and a model of it, on a scale of not less than one inch to a foot, to be produced to the Society on or before the first Tuesday in February, 1817.

154. WATER PIPES.

To the person who shall invent and discover to the Society a substitute for the elm pipes now in common use for the conveyance of water, which shall be cheaper, equally effectual, and more durable than any heretofore employed; the gold medal, or fifty guineas.

It is required that one of the pipes so employed, an accurate *account* of the method used, and every expense attending it, together with satisfactory accounts of its being effectual, be delivered to the Society on or before the second Tuesday in January, 1817.

155. LAYING WOODEN PIPES.

To the person who shall invent and discover to the Society a superior method of laying or connecting the wooden pipes now in use for conveying water, so as to lessen the injury they receive thereby; the silver medal, or twenty guineas.

It is required that a model, an accurate *account* of the method used, and every expense attending it, together with satisfactory *certificates* of its being effectual, be delivered to the Society on or before the second Tuesday in January, 1817.

156. EXTINGUISHING FIRES.

To the person who shall produce to the Society the best and most effectual method of procuring an immediate supply of water in case of fire, or for the means best calculated to prevent or extinguish accidental fires in buildings, superior to any now in use; the gold medal, or thirty guineas.

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the second Tuesday in January, 1817.

157. BORING AND BLASTING ROCKS.

To the person who shall discover to the Society a more simple, safe, cheap, and expeditious method than any hitherto known or in use, of boring or blasting rocks in mines, shafts, wells, &c.; the gold medal, or thirty guineas.

Certificates of the methods having been practised with success, with a full description thereof, to be delivered to the Society on or before the first Tuesday in January, 1817.

158. HEATING ROOMS FOR THE PURPOSE OF MANUFACTURERS.

To the person who shall invent and discover to the Society a method of heating rooms, superior to any hitherto known or in use, and at a moderate expense, for the purpose of painters, japanners, and other manufacturers, so as to avoid the necessity of iron or copper tunnels going through the rooms to convey the smoke, whereby the danger from such tunnels may be prevented; the gold medal, or forty guineas.

A model or complete drawing and description of the method, with *certificates* that it has been successfully practised, to be delivered to the Society on or before the last Tuesday in March, 1817.

159. IMPROVED VENTILATION.

To the person who shall invent and produce to the Society a mode of permanently ventilating the apartments in hospitals, workhouses, and other crowded places, superior to any now known or used; the gold medal, or fifty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, with proper *certificates*, to be delivered to the Society on or before the last Tuesday in February, 1817.

160. PREVENTING ACCIDENTS FROM HORSES FALLING WITH TWO-WHEELED CARRIAGES.

To the person who shall invent and produce to the Society a method, superior to any hitherto known or in use, to prevent accidents from the falling of horses with two-wheeled carriages, especially on steep declivities; the silver medal, or fifteen guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, with proper *certificates* that the same has been used with success, to be delivered to the Society on or before the second Tuesday in January, 1817.

161. IMPROVING TURNPIKE AND OTHER ROADS.

To the person who shall discover to the Society the most effectual and cheapest method, verified by actual experiments, of combining the materials ordinarily employed in making or repairing roads, so as to form them of the hardest consistency by their cementing properties, or by an artificial mixture of earth, stones, &c. altered by heat, or any other mode, so as to form an even, hard, and durable carriage-road; the gold medal, or thirty guineas.

It is required that an accurate *account* of the method used, and every expense attending it, together with satisfactory *certificates* of its being effectual, be delivered to the Society on or before the first Tuesday in March, 1817.

162. RAISING THE BODIES OF PERSONS WHO HAVE SUNK UNDER WATER.

To the person who shall invent and produce to the Society a cheap and portable drag, or other machine, superior to those now in use, for the purpose of taking up, in the best and most expeditious manner, and with the least injury, the bodies of persons who have sunk under water; the gold medal, or thirty guineas.

The drag or machine, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in March, 1817.

163. FOR PREVENTING PREJUDICIAL EFFECTS TO THE PERSONS EMPLOYED IN POINTING NEEDLES.

To the person who shall invent and produce to the Society a mode of obviating the prejudicial effects that attend the operation of pointing needles, by grinding them dry, during which the particles of grindstone-dust, and steel, being thrown into the air, and received with it into the lungs, occasion asthma, consumption, and other painful disorders; the gold medal, or thirty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, together with proper *certificates* of its practicability and adoption, to be delivered to the Society on or before the second Tuesday in March, 1817.

164. FOR PREVENTING ACCIDENTS FROM STAGE COACHES.

To the person who shall invent and discover to the Society a method or methods for preventing accidents arising from stage coaches; the gold Isis medal, or thirty guineas.

Ample *certificates* of its efficacy, and a description of the method, with models of the machinery used, to be produced to the Society on or before the last Tuesday in February, 1817.

N. B. The Society wish to impress strongly on the public the necessity of turning their attention to the above premium, from the number of accidents that daily occur; and suggest whether the prevention would not, in some degree,

arise by an alteration in the manner of placing the luggage.

165. MAKING HOSE FOR THE USE OF FIRE ENGINES, BREWHOUSES, &c.

To the person who shall invent a method of making hose for fire engines, brewhouses, &c. similar to those used on the Continent, made of flax or hemp, or other flexible material cheaper than leather; the gold Isis medal, or thirty guineas.

A full *account* of the process used in manufacturing it, with *certificates* of its efficacy in practice, to be produced to the Society on or before the last Tuesday in February, 1817.

166. A SUBSTITUTE FOR LEAD PIPES.

To the person who shall discover, or invent and produce to the Society, a substitute for the lead pipes used for conveying malt and other liquors from the cellars to the bars of public houses; the gold medal, or fifty guineas.

Conditions. The substance of which the pipe is made must be free from any poisonous or noxious quality, equally durable as lead, and at a moderate expense; and a specimen thereof, not less than ten yards in length, with a complete description of the process employed in forming it, to be produced to the Society on or before the last Tuesday in February, 1817.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE COMMERCE OF THE UNITED EMPIRE.

167. TAKING PORPOISES.

To the people in any boat or vessel, who, in the year 1815, shall take the greatest number of porpoises on the coast of Great Britain or Ireland, by gun-harpoon, or any other method, not fewer than thirty, for the purpose of extracting oil from them; the gold medal, or thirty guineas.

Certificates of the number, signed by the persons to whom they have been sold or delivered for the purpose of extracting the oil, to be produced to the Society on or before the last Tuesday in January, 1817.

168. OIL FROM PORPOISES.

To the person who shall manufacture the greatest quantity of oil from porpoises taken on the coast of Great Britain or Ireland, in the year 1816, not less than twenty tons; the gold medal, or thirty guineas.

Certificates of the oil having been made from porpoises actually caught on the coast of Great Britain or Ireland, and two gallons of the oil as a sample, to be produced to the Society on or before the last Tuesday in February, 1817.

169. CURING HERRINGS.

To the person or persons who shall, before January, 1817, cure the greatest quantity of white herrings, not less than thirty barrels, equal in all respects to the best Dutch herrings, the same being caught in the British or Irish seas, and cured in a British or Irish vessel or port; the gold medal, or fifty guineas.

170. For the next greatest quantity, not less than fifteen barrels; the silver medal, or twenty guineas.

A sixteen-gallon barrel of the herrings to be produced to the Society on or before the first Tuesday in February, 1817, with *certificates*, that the conditions of the premium have been fulfilled, and that the whole were cured in the same manner as the specimen, together with a full description of the process employed.

171. CURING MACKAREL.

To the person or persons who shall, before January, 1817, cure the greatest quantity of mackarel not less in number than ten thousand, in the best manner and to the satisfaction of the Society, the same being caught in the British or Irish seas, and cured in a British or Irish vessel or port; the gold Isis medal, or twenty-five guineas.

172. For the next greatest quantity, not less than five thousand; the silver medal, or fifteen guineas.

A sixteen-gallon barrel of the mackarel to be produced to the Society on or before

the first Tuesday in January, 1817, with *certificates* that the conditions of the premiums have been fulfilled, and that the whole were cured in the same manner as the specimens, together with a full description of the process employed.

The same premiums to be extended one year further, on similar conditions.

N. B. Specimens of cured mackarel, which promise to afford a most valuable article of trade and food, even superior to herrings, have been sent to the Society, and induced them to turn the attention of the public thereto, by offering the above premiums.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH COLONIES.

173. NUTMEGS.

For the greatest quantity of merchantable nutmegs, not less than ten pounds weight, being the growth of his Majesty's dominions in the West Indies, or any of the British settlements on the coast of Africa, or the several islands adjacent thereto, and equal to those imported from the islands of the East Indies; the gold medal, or fifty guineas.

Satisfactory *certificates*, from the governor or commander in chief, of the place of growth, with an *account* of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the first Tuesday in January, 1817.

174. KALI FOR BARILLA.

To the person who shall have cultivated, in the Bahama Islands, or any other part of his Majesty's dominions in the West Indies, or any of the British settlements on the coast of Africa, or the several islands adjacent thereto, in the year 1815, the greatest quantity of land, not less than two acres, with Spanish kali fit for the purpose of making barilla; the gold medal, or thirty guineas.

175. For the next greatest quantity, not less than one acre; the silver medal, or fifteen guineas.

Certificates, signed by the governor or commander in chief for the time being, of the quantity of land so cultivated, and of the state of the plants at the time of signing such *certificates*, to be delivered to the Society, with samples of the kali, on or before the second Tuesday in January, 1817.

176. DESTROYING THE INSECT COMMONLY CALLED THE BORER.

To the person who shall deliver to the Society an effectual method of destroying the insect commonly called the borer, which has of late years been so destructive to the sugar canes in the West India islands, the British settlements on the coast of Africa, and the several islands adjacent thereto; the gold medal, or fifty guineas.

The discovery to be ascertained by satisfactory *certificates*, under the hand and seal of the governor or commander in chief for the time being, and of some other respectable persons, inhabitants of the islands, or other place, in which the remedy has been successfully applied; such *certificates* to be delivered to the Society on or before the first Tuesday in January, 1817.

177. CULTIVATION OF HEMP IN UPPER CANADA.

To the person who shall sow with hemp the greatest quantity of land in the province of Upper Canada, not less than six arpents (each four-fifths of a statute acre), in the year 1815, and shall at the proper season cause to be plucked the summer hemp (or male hemp bearing no seed), and continue the winter hemp (or female hemp bearing seed), on the ground until the seed is ripe; the gold medal, or one hundred dollars.

178. To the person who shall sow with hemp the next greatest quantity of land in the same province of Upper Canada, not less than five arpents, in the year 1815, in the manner above mentioned; the silver medal, or eighty dollars.

179. For the next greatest quantity of land, in the same province, and in a similar manner, not less than four arpents; sixty dollars.

180. For the next greatest quantity of land, in the same province, and in a similar manner, not less than three arpents; forty dollars.

181. For the next greatest quantity of land, in the same province, and in a similar manner, not less than one arpent; twenty dollars.

Certificates of the number of arpents, the method of culture, of the plucking of the hemp, with a general *account* whether sown broad-cast or in drills, the expense, soil, cultivation and produce, to be transmitted to the Society, certified under the hand and seal of the governor or lieutenant-governor, together with 28lb. of the hemp, and two quarts of the seed, on or before the last Tuesday in April, 1817.

182 to 186. IN LOWER CANADA.

Premiums exactly similar in all respects to those held out for the province of Upper Canada, are also offered to the province of Lower Canada.

187 to 191. IN NOVA SCOTIA AND NEW BRUNSWICK.

Similar premiums in all respects are also offered to the provinces of Nova Scotia and New Brunswick.

192. IMPORTATION OF HEMP FROM CANADA, NOVA SCOTIA, AND NEW BRUNSWICK.

To the master of that vessel which shall bring to this country the greatest quantity of marketable hemp, not less than one hundred tons, in the year 1816, the produce of Upper Canada, or of one of the above mentioned provinces; the gold medal.

193. To the master of that vessel which shall bring the next quantity, not less than fifty tons; the silver medal.

Certificates satisfactory to the Society, to be produced by the master of the vessel on or before the first Tuesday in February 1817, to testify that such hemp was grown and prepared in Canada, Nova Scotia, or New Brunswick.

194. SUBSTITUTE FOR HEMP.

To the person who, in the year 1816, shall discover and produce to the Society a substitute for hemp, equally cheap, durable, and applicable to all the purposes for which hemp is now used; the gold medal, or fifty guineas.

A quantity of the substitute, not less than one hundred weight, together with the proper *certificates* from the governor or commander in chief, if raised in any of the British colonies, or from the Secretary of the Board of Trade, if raised in the East Indies, to prove that the same has been used with success, to be produced to the Society on or before the last Tuesday in February, 1817.

N. B. The premiums for Nos. 172, *to* 189, *are all extended one year further, on similar conditions. Certificates to be produced at the same time for the year ensuing.*

196. SILK.

For the greatest quantity of silk proper for manufactures, not less than one hundred pounds weight, produced by any person in Malta, or islands near or adjacent thereto, in the possession of Great Britain, in the year 1816, from silk-worms bred there; the gold medal, or fifty guineas.

Specimens of the silk, not less than one pound, with an *account* of the method in which the silk-worms were managed; the kind and size of the mulberry-trees from whence they were furnished with food, and particulars respecting the culture of the mulberry-trees for that purpose, to be produced to the Society on or before the first Tuesday in March, 1817.

197. For the next greatest quantity not less than fifty pounds, on similar conditions; the silver medal, or twenty guineas.

Satisfactory *certificates* from the governor or commander in chief of the district where the said silk was produced, and of the several particulars above mentioned, to be delivered to the Society along with the samples required.

N.B. The same premiums, on similar conditions, will be given for silk produced in the years 1817 and 1818, *certificates* to be sent at the same time of the years ensuing.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH SETTLEMENTS IN THE EAST INDIES.

198. BHAUGULPORE COTTON.

To the person who shall import into the port of London, in the year 1816, the greatest quantity, not less than one ton, of the Bhaugulpore cotton, from which cloths are made in imitation of nankeen, without dyeing; the gold medal.

A quantity of the cotton, not less than five pounds weight, in the pod, and five pounds carded, to be produced to the Society, with proper *certificates*, signed by the Secretary of the Board of Trade of Bengal or Bombay, on or before the last Tuesday in February, 1817.

199. ANNATTO.

To the person who, in the year 1816, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of annatto, not less than five hundred weight; the gold medal.

A quantity of the annatto, not less than ten pounds weight, to be produced to the Society, with proper *certificates*, signed by the Secretary of the Board of Trade of the respective settlement, that the annatto is the produce of such settlement, on or before the last Tuesday in Feb. 1817.

200. TRUE COCHINEAL.

To the person who, in the year 1814, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of true cochineal, not less than three hundred weight; the gold medal.

A quantity of the cochineal, not less than three pounds weight, with proper *certificates*, signed by the Secretary of the Board of Trade of the respective settlement, that the cochineal is the produce of such settlement, to be produced to the Society on or before the first Tuesday in February, 1816.

N.B. The Premiums from No. 192 *to* 196 *inclusive, are all extended two years further, on similar conditions. Certificates to be produced at the same time of the years ensuing.*

GENERAL CONDITIONS.

AS the great object of the Society in rewarding individuals is to draw forth and give currency to those inventions and improvements, which are likely to benefit the public at large, candidates are requested to observe, that if the *means*, by which the respective objects are effected, do require an expense or trouble too great for *general purposes*, the Society will not consider itself bound to give the offered *reward*; but, though it thus reserves the power of giving in all cases such part only of any premium as the performance shall be adjudged to deserve, or of withholding the whole if there be no merit, yet the candidates may be assured the Society will always judge liberally of their several claims.

All candidates are to take notice, that no claim for a premium will be attended to, unless the conditions are fully complied with.

The models of all machines, which obtain premiums or bounties, shall be the property of the Society.

The premiums of this Society are designed for the United Kingdom, unless expressly mentioned to the contrary.

The claims will be determined as soon as possible after the delivery of the specimens.

It is expected that all articles for claims or bounties be sent to the Society, carriage paid.

No person shall receive any premium, bounty, or encouragement, from the Society, for any matter for which he has obtained or purposes to obtain, a patent, or for which he has obtained any premium or reward from any other Society.

A candidate for a premium, or a person applying for a bounty, being detected in any disingenuous method to impose on the Society, shall forfeit such premium or bounty, and be deemed incapable of obtaining any for the future.

No member of this Society shall be a candidate for, or entitled to receive, any premium, bounty, or reward whatsoever, except the honorary medal of the Society. The candidates are, in all cases, expected to furnish a particular account of the subject of their claims; and where certificates are required to be produced in claim of premiums, they should be expressed, as nearly as possible, in the words of the respective advertisement, and be signed by disinterested persons who have a positive knowledge of the facts stated.

Where premiums or bounties are obtained in consequence of specimens produced, the Society mean to retain such part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No candidate, not a member, shall be present at any meeting of the Society or Committees, or admitted at the Society's rooms, after they have delivered in their claims, until such claims are adjudged, unless summoned by the Committee.

The Society, anxious to promote the Arts of their country, have adopted the resolution of forming a Collection of Prints, to be open for public inspection; and, having arranged those already in their possession, invite engravers to send etched or finished proofs of their plates; and hope that amateurs, collectors, and publishers of works of art, will also contribute to the undertaking.

Prints of machines, or maps, will also come within this arrangement.

This Society further invite the communications of scientific and practical men, upon all subjects connected with the views of this Society, although their experiments may have been conducted upon a smaller scale than the terms required by the premiums; as such communications may afford ground for more extensive application, and thus materially contribute to the advantage of the public.

The Library of the Society, which has already become very valuable, may yet receive considerable additions and improvements from the presents of members, or other persons who may be inclined to place useful books or valuable manuscripts in a repository at once permanent and conducive to the national benefit.

All communications are to be made by letter, addressed to CHARLES TAYLOR, M.D. the Secretary, *at the Society of Arts, &c. Adelphi, London.*

And where articles are sent by Sea for the Society, the Bills of Lading are to be addressed to the care of WILLIAM VAUGHAN, Esq. *Mincing-lane, London*, who has undertaken to receive them for the Society.

The Winchester bushel is the measure referred to for grain; and, as the acres of different districts vary in extent, it is necessary to observe, that the Society mean Statute Acres of five and a half yards to the rod or pole, and they request that all communications to them may be made agreeably thereto.

The Society desire that the Papers on different subjects sent to them may be full, clear, and explicit, fit for publication; and that descriptive Drawings may be sent, with the Models and Machines laid before the Society.

*** To persons inclined to leave a sum of money to this Society by will, the following form is offered for that purpose.

Item. I give and bequeath to A. B. and C. D. the sum of upon condition and to the intent that they, or one of them, do pay the same to the Collector, for the time being, of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures and Commerce; which said sum of I will and desire may be laid out of my personal estate, and applied towards the carrying on the laudable designs of the Society.

N. B. The Society considering that it would be beneficial to the Commerce of the United Kingdom to bring the British Marbles into general use, and that the most effectual method of accomplishing their object would be, for the present, *to make them more generally known in the Capital, have come to the following resolution:*

Resolved, That specimens of British Marbles be exposed in the Society's Rooms, in the Adelphi, for the inspection of the public, under the following regulations:

1st, That all the specimens be exact to a given size, viz. eight inches high, six inches broad, one thick, and polished on one face.

2d, That a book be kept, containing the number of each specimen, and describing the situation of the quarry, the name of the parish were situated, the distance of the quarry from a beaten road, and the distance of that road from water-carriage, with the name of the donor and proprietor. Any remarks on the qualities of the marbles, or on the lime produced from them, will be gratefully received and preserved by the Society, as materials for future inquiries.

As the exertions of the Society can be generally beneficial, only inasmuch as their views are seconded by the public, the Society request, that all proprietors of marble quarries will favour them with a specimen of the marble, worked to the exact size above mentioned, with the description of the quarry as above, that the same may be entered in the book to be preserved for the use of the public. By such arrangements, it is expected that the interest of the proprietors of the quarries will be promoted, and the use of British marble much extended. A variety are already exhibited in the Society's Rooms.

The Society take this opportunity of returning their thanks to the several Societies and individuals who have favoured them with Presents for their Repository and Library.

PREMIUMS AND REWARDS

BESTOWED BY THE

Society of Arts, Manufactures, and Commerce,

ADELPHI,

DURING THEIR SESSION,

WHICH COMMENCED ON THE FIRST WEDNESDAY IN NOVEMBER, 1815, AND CLOSED ON THE ELEVENTH OF JUNE, 1816.

On Friday, May 31, 1816,
His Royal Highness the DUKE of SUSSEX, President,
distributed the Rewards then adjudged.

IN AGRICULTURE.

No. 1. To her Grace the Duchess of Rutland, Belvoir Castle, for ascertaining the best method of raising oaks, Art. 5, the gold medal.

2. To John Christian Curwen, V.P. M.P. Workington hall, Cumberland, for his method of bringing cattle to early maturity, so as to furnish good beef in much less time than heretofore known, the gold medal.

3. To Wm. Congreve, Esq. Aldermaston House, Berks, for planting 447 acres with acorns, Art. 1, the gold medal.

4. To Michael Meek, Esq. of Sober, near Northallerton, for planting 134 acres with 588,763 forest trees, Art. 14, the gold medal.

5. To Bache Thornhill, Esq. of Stanton, near Bakewell, Derbyshire, for planting 116 acres with 315,000 forest trees, Art. 15, the silver medal.

6. To J. G. Hall, Esq. of Mixbury, near Buckingham, for protecting 1,160 Merino sheep, Art. 58, the gold medal.

IN CHEMISTRY.

1. To Mr. George Field, Heath Cottage, Hounslow, for his apparatus for preparing coloured lakes, the gold Isis medal.

2. To Mr. James Ryan, Netherton Colliery, near Dudley, for his method of ventilating coal mines, the gold medal, and one hundred guineas.

3. To Dr. Clanny, Bishop-wearmouth, near Newcastle, for his safety lamps, for mines, the silver medal.

4. To Mr. C. Pye, 27, Euston Place, Euston Square, for preparing charcoal to answer the purpose of black chalk for drawing, the silver Isis medal.

IN POLITE ARTS.

1. To Miss Emma Eleonora Kendrick, Upper Mary-le-bone Street, Fitzroy Square, for an original miniature of Dido on the funeral pile, the gold Isis medal.

2. To Miss Caroline Hunning Evatt, East Hill, Wandsworth, Surry, for a copy of the head of our Saviour, an oil painting, the silver medal.

3. To Miss Henrietta Sutherland, Sloane Square, for an original drawing of the keeper's cottage, in Hyde Park, the silver Isis medal.

4. To Miss Louisa Anne Phillipps, Wandsworth Road, for an original view of the interior of a castle at Putney, the silver palette.

5. To Mr. W. C. Ross, Macclesfield-Street, Soho, for an original portrait of his Grace the late Duke of Norfolk, Class 112, the gold Isis medal.

6. To Mr. William Harris, jun. Norton Street, Portland Place, for an original drawing of part of the interior of Waltham Abbey, the silver Isis medal.

7. To Lieutenant Robert Smith, Queen's Buildings, Brompton, for an original view of the Marina of Palermo, the silver medal.

8. To Mr. Wm. Ensom, Swinton Street, Gray's-Inn Lane Road, for a pen and ink drawing of one of Lebrun's battles, the silver medal.

9. To Mr. John Carver, Great Russell Street, Bloomsbury, for a copy of a print from Sir Joshua Reynolds; the effect produced by a pen-knife from wood charred on the surface; the silver Isis medal.

10. To Master Frederick Yeates Hurlstone, Great Queen Street, Lincoln's Inn Fields, for an oil painting of our Saviour and the three Marys, the silver medal.

11. To Miss Emma Gatley, Margaret Street, Cavendish Square, for a drawing of flowers, class 103, a copy, the silver medal.

12. To Miss B. Cotton, Chichely, Newport Pagnell, Bucks, for an original drawing of fruit and flowers, the silver medal.

13. To Miss Dutton, Gracechurch Street, for an original oil painting of Kenilworth Castle, the silver palette.

14. To Mr. Hen y Douglas Craig, Charlotte Street, Fitzroy Square, for an original drawing of a lady and a hare, the silver Isis medal.

15. To Mr. Edwin Landseer, No. 33, Foley Street, for an original painting of the stable guardian, the silver medal.

16. To Master George Patten, Ludgate Hill, for an original miniature of a gentleman, the silver palette.

17. To Master Hugh Ross, Macclesfield Street, for a miniature of his Grace the late Duke of Norfolk, the silver palette.

18. To Mr. Thomas Smith, Upper Norton Street, for a drawing of a Dead Christ, a copy, the silver Isis medal.

19. To Mr. John Hayter, Woodstock Street, Bond Street, for a copy of the Transfiguration, the silver Isis medal.

20. To Miss Leonora Say, Norton Street, Mary-le-bone, for a drawing of Andromache, a copy, Class 112, the silver medal.

21. To Miss Anne Powell, of Manchester, for a drawing of Samuel and Eli, a copy, the silver Isis medal.

22. To Miss Emma Swinley, Crescent, Brighton, for a drawing of Angels receiving a good spirit, a copy, the silver palette.

23. To Mr. Thomas Lee, jun. Devonshire Street, for an original architectural design for a British Senate House, Class 113, the gold medallion, in conformity to the will of the late John Stock, Esq. of Hampstead.

24. To Mr. John Winckworth, Upper Norton-street, Fitzroy Square, for an original architectural design for a British Senate House, Class 113, the silver medallion, in conformity to the said will.

25. To Mr. H. W. Inwood, jun. Southampton Place, Euston Square, for an original view of an architectural public building, the silver Isis medal.

26. To Mr. Robt. Hudson, Duchy Place, opposite Catharine Street, for a drawing of Ajax's head, from a cast, the silver palette.

27. To Mr. John Henning, sen. Glasshouse Street, Piccadilly, for an original die engraving of Vulcan and attendants, the silver medal.

28. To Mr. John Henning, jun. Glasshouse Street, Piccadilly, for a cast in plaster, of the Good Samaritan, the silver Isis medal.

29. To Miss Janet Ross, Martlett Court, Bow Street, for an original chalk drawing of Venus, from the statue in the British Museum, Class 107, the silver medal.

30. To Miss Emma Tomkins, New Bond Street, for a chalk drawing of the Head of Apollo, a copy, the silver Isis medal.

31. To Mrs. M. E. Muchal Griffith, Holt Street House, Wrexham, for her copy and coloured drawings of the thirteenth volume of the Botanical Magazine, the silver medal.

32. To Mr. William Scoular, Clarendon Street, Somers Town, for a copy of the large antique statue of the Faunus, the silver medal.

33. To Mr. Frederick Wm. Smith, Bridge Row, Chelsea, for an alto-relievo of the Death of Pallas, the silver Isis medal.

34. To Mr. Henry W. Peck, Union Place, Shoreditch, for a plaster cast of Adam and Eve, the silver medal.

35. To Mr. Thomas Merrifield, Princes Street, Bedford Row, for an original model of Diana, the silver palette.

36. To Mr. Henry Fownes, Poplar House, Battersea, for profiles cut on Cowrie shells, the silver Isis medal.

37. To Master John Scarlet Davis, Leominster, for an engraving, the silver palette.

IN MANUFACTURES.

1. To Messrs. Tharp and Buck, for the production of Merino wool, from the breed of Spanish sheep in England, in 1819, the gold medal.

2. To Mr. G. Flower, Marden, near Hertford, for the production of Merino wool from the breed of Spanish sheep in England, class 132, the gold medal.

3. To Mr. Thos. Schorrar, Green Street, Bennet's Row, Blackfriars, for his improved machine for blocking straw hats, the silver Isis medal and five guineas.

IN MECHANICS.

1. To Admiral Sir Home Popham, Greenwich, for a telegraph, and marine vocabulary, the gold medal.

2. To the Rev. Edmund Cartwright, D.D. Hollanden House, near Tunbridge, Kent, for a traversing apparatus, the gold Isis medal.

3. To the son of the late Major C. Le Hardy, of Jersey, for the method of effecting communications between stranded vessels and the shore, the gold medal.

4. To Mr. Wm. Bremner, Lower Eaton Street, Pimlico, for an instrument for conveying ligatures around deeply situated arteries, the gold medal.

5. To Mr. Wm. Bremner, Lower Eaton Street, Pimlico, for an instrument for the extirpation of Polypi, the gold Isis medal.

6. To Lieut. M. Shuldham, R. N. Great Titchfield Street, for improved pullies and blocks, the gold Isis Medal.

7. To Lieut. M. Shuldham, R. N. Great Titchfield Street, for improvement in working a capstan, the silver medal.

8. To Mr. Thomas Pering, Dorset Street, Salisbury Square, for his tables, called the Expeditious Navigator, the gold Isis medal.

9. To Mr. James Allen, Blewitt's Buildings, for a Theodolite, the gold Isis medal.

10. To Mr. James Allen, Blewitt's Buildings, for his method of making screws for mathematical purposes, the silver Isis medal.

11. To the Rev. James Bremner, Shetland Islands, for a night telegraph, the silver medal, and fifteen guineas.

12. To the Rev. James Bremner, Shetland Island, for a day telegraph, the silver medal, and ten guineas.

13. To Mr. William Cubitt, Ipswich, for an instrument for drawing ellipses, the silver medal.

14. To Mr. Charles West, Cursitor Street, Chancery Lane, for a parallel rule, the silver Isis medal.

15. To Mr. Edmund Turrel, Gee Street, Clarendon Square, for a drawing board and T square, the silver medal, and five guineas.

16. To Mr. Thomas Allason, Westbourne Green, Paddington, for a graphic instrument, the silver Isis medal.

17. To Mr. James Braby, Vine Street, Narrow Wall, Lambeth, for a fire escape, the silver medal.

18. To Mr. Edward Parker, No. 6, High Holborn, for a single door spring, the silver medal.

19. To Mr. Thomas Robarts, Dumfries, for a machine for ventilation, in pointing needles, ten guineas.

20. To the Chevalier Baader, Munich, for his rotary motion, the silver medal.

21. To Mr. J. Goodwin, of Carlton House, for his probang for administering medicine to horses, the silver medal.

22. To Mr. Thomas Perry, Farnham, for his anenchronumerist, or instantaneous calculator, the silver medal.

23. To Mr. Jonathan Dickson, Holland Street, Blackfriars, for his method of propelling steam boats, the silver medal.

24. To Mr. Thos. Barber, Princes Street, Soho, for an anglograph, the silver Isis medal.

IN COLONIES AND TRADE.

1. To Thomas Hoblyn, Esq. Sloane Street, for preparing rice in the Isle of Ceylon, the gold Isis medal.

2. Lieutenant-Colonel Bouchette, Canada, for an extensive map of Canada, the gold medal.

*** *The Public are requested to guard against impositions, from persons Advertising, or pretending to have Patents for Articles rewarded by the Society. It is a stipulated condition, that all Persons who receive Premiums or Bounties from the Society, shall relinquish all Pretensions to a Patent for Articles so rewarded, and shall allow them to be made by any Person whatever.*

The Public are also cautioned against Purchasing Articles sold under a pretended sanction of the Society's Name. Information may be had, by inquiry at the Society's House, whether the advertised Articles are, or are not, Deceptions upon the Public.

*** Since the last Distribution of Rewards, THREE HUNDRED New Members have been elected.

The LIST OF PREMIUMS offered, may be had *gratis*, at the Society's House, in the Adelphi. By Order of the Society,

June, 1816. CHARLES TAYLOR, M.D. Secretary.

N.B. Where errors have arisen in the address of any Member of the Society, information is desired to be given to Mr. R. ELWIN, the Collector, at the Society's House, in the Adelphi, who receives the Subscriptions from the Members, and furnishes Receipts for the same.

Lately was published, Price 10*s.* 6*d.*

THE THIRTY-THIRD VOLUME of the SOCIETY'S TRANSACTIONS, which may be had from the Housekeeper, at the Society's House, in the Adelphi. Also complete Sets of their Transactions, or any single Volume.

Also, An ANALYTICAL INDEX of the FIRST TWENTY-FIVE VOLUMES of the TRANSACTIONS of the SOCIETY, to the termination of their Session, June, 1807, price 5*s*. With a list of the Machines and Models in the Society's Repository, to the year 1813, inclusive.

A CATALOGUE of BOOKS in the Society's Library, may be procured as above, price One Shilling, with an Appendix thereto.

IT is to be observed, that PLATE XXIV. of this Volume having met with an accident while in the Engraver's hands, is necessarily omitted. It contained a *general* view of Mr. ALLAN's Theodolite, the separate parts of which are represented on Plate 23. As, however, all the references in the description relate to this latter Plate, no material inconvenience can arise from the omission, which has been determined on in preference to any further delay in the publication of the Volume.

PREMIUMS

OFFERED IN THE YEAR 1816,

BY THE SOCIETY

INSTITUTED FOR THE ENCOURAGEMENT

OF

ARTS, MANUFACTURES, AND COMMERCE,

IN THE ADELPHI, LONDON.

THE Meetings of the Society are held at their House in the Adelphi, London; and the consideration of the Claims, offered in the present List, will take place during the Session of the Society commencing on Wednesday the 6th of November, 1816.

ADVERTISEMENT TO THE PUBLIC.

THE chief object of the SOCIETY is to promote the Arts, Manufactures and Commerce of this Kingdom, by giving honorary or pecuniary Rewards, as may be best adapted to the case, for all such useful Inventions, Discoveries, and Improvements, (though not mentioned in this advertisement) as tend to that purpose; and, in pursuance of this plan, the Society have already expended above EIGHTY THOUSAND POUNDS, advanced by voluntary subscriptions of Members, and legacies bequeathed.

The Register of Premiums and Bounties they have given, which may be seen at the SOCIETY's house in the Adelphi, will show the very great advantages which the Public have derived from this Institution.

The meetings of the SOCIETY are held every Wednesday, at seven o'clock in the evening, from the first Wednesday in November to the second Wednesday in June. The several Committees meet on other evenings in the week during the session, as particularly mentioned in their printed book of Rules and Orders.

In order still farther to promote the laudable Views of the SOCIETY, it may be necessary to explain the mode by which Members are elected.

Each Member has the privilege, at the meeting of the SOCIETY, or by letter to the Secretary, to propose any person who is desirous to become a Member; such proposal to contain the name, full addition, and place of abode, of the proposed Member, and to be signed by three members of the SOCIETY.

Peers of the Realm or Lords of Parliament are, on their being proposed, immediately ballotted for; the names of other persons proposed to become Members are read by the Secretary, at the next meeting of the SOCIETY, and then inserted in lists which are hung up in the SOCIETY's room; they are ballotted for at the second following ordinary meeting. In both cases, if two-thirds of the Members then voting ballot in their favour, they are deemed Perpetual Members upon payment of not less than Twenty Guineas in one sum, or Subscribing Members upon payment of any sum not less than Two Guineas annually.

All Members are entitled to vote and assist in all the business of the SOCIETY and the several Committees. The Members have also the privilege of recommending two persons as auditors at the meetings of the SOCIETY; and, by addressing a note to the housekeeper, of introducing their friends to examine the various Models, Machines, and Productions, in different branches of Arts, Manufactures, and Commerce, for which rewards have been bestowed; also to inspect the magnificent series of Moral and Historical Paintings, executed by the late J. BARRY, Esq. which, with some valuable Busts, Statues, &c. decorate the Great Room.

Members have the use of the Society's Library, which is valuable and annually increasing, from donations of scientific and useful books and engravings. The SOCIETY are highly sensible of the great importance of such acquisitions, and are happy to record them, with the names of the donors, in the Volume annually published of the SOCIETY's Transactions, to which the Members are intitled.

Ladies are eligible, as Members of the SOCIETY, to all the Privileges thereof, and are alone entitled to vote by proxy at elections, through the medium of any gentleman who is a member, on his producing a written authority for the same.

The time appointed for admission to the Paintings or Models, is from ten to two o'clock, Sundays and Wednesdays excepted.

ORDERED, SOCIETY's HOUSE, ADELPHI, JUNE 1st, 1815.

That the several candidates and claimants, to whom the Society shall adjudge Premiums or Bounties, do attend as required by the Secretary, on the last Tuesday in May, 1817, at eleven o'clock in the forenoon precisely, to receive the same; that Day being appointed by the Society for the Distribution of their Rewards; and before that time no Premium or Bounty will be delivered, except to those who are about to leave the Kingdom.

In cases where the Society may think fit to admit excuses for not attending in person, deputies may be substituted to receive the Rewards, provided such Deputies are either Members of the Society, or superior Officers thereof.

A LIST of the Officers of the SOCIETY, *and Chairmen of the several Committees.*

PRESIDENT.

His Royal Highness the DUKE of SUSSEX, K. G. &c. &c.

VICE-PRESIDENTS.

John, Duke of Bedford, F.A.S.
Hugh, Duke of Northumberland, F.R. and A.S.
G. G. L. Marquis of Stafford, K.G.
Jacob, Earl of Radnor, F.R. and A.S.
Robert, Earl of Liverpool, F.R.S.
Charles, Earl of Romney, F.R.S.
Hugh Earl Percy.
Hon. Robert Clifford, F.R. and A.S.
Sir Robert Peel, Bart, M.P.
Sir Watkin Lewes, Knt.
Sir Nathaniel Conant, Knt.
Thomas Pitt, Esq. F.A.S.
Richard Clark, Esq. Chamberlain, F.A.S.
Richard Powell, M.D.
John Christian Curwen, Esq. M.P.
Richard Wilson, Esq. F.A.S.

CHAIRMEN OF COMMITTEES.

Accounts.

William Lumley, Esq.
Abraham Osorio, Esq.

Correspondence and Papers.

William Tooke, Esq.
Daniel Moore, Esq. F.R. & A.S.

Polite Arts.

J. Barber Beaumont, Esq. F.A.S.
R. H. Solly, Esq. F.R. and A.S.

Agriculture.

T. H. Andrew, Esq.
Charles Waistell, Esq.

Manufactures.

J. Pearsall, Esq.
I. Smith, Esq.

Mechanics.

Thomas Gill, Esq.
Bryan Donkin, Esq.

Chemistry.

Henry Coxwell, Esq.
G. D. Midgley, Esq.

Colonies and Trade.

William Lewis, Esq. F.L.S.
William Vaughan, Esq.

Miscellaneous Matters.

William Kirkby, Esq.
Daniel Beaumont, Esq.

SECRETARY, Charles Taylor, M.D.
ASSISTANT SECRETARY, Mr. Thomas Woodfall.
HOUSEKEEPER, Miss A.B. Cockings.
COLLECTOR, Mr. Robert Elwin.

PREMIUMS offered in 1816, *by the* SOCIETY *instituted at* London, *A. D.* 1754, *for the Encouragement of Arts, Manufactures, and Commerce.*

PREMIUMS IN AGRICULTURE.

THE Candidates for planting all kinds of trees are to mention the nature of the soil, to produce certificates that the respective plantations are properly fenced and secured, and particularly to state the condition of the plants at the time of sending such certificates. Any information which the candidates for the following premiums may choose to communicate, relative to the methods made use of in forming the plantations, or promoting the growth of the several trees, or any other observations that may have occurred on the subject, will be thankfully received.

It is the intention of the Society that such lands only as are not calculated for the purposes of husbandry, should be employed for the purposes specified in these advertisements relative to plantations.

ARTICLE 1.—ACORNS.

FOR having set between the first of October, 1814, and the first of April, 1815, the greatest quantity of land, not less than ten acres, with acorns, with or without seeds, cuttings, or plants of other trees, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber: the gold medal.

2. For the second greatest quantity of land, not less than five acres, set agreeably to the above conditions; the silver medal.

Certificates of setting agreeably to the above conditions, and that there are not fewer than three hundred young oaks on each acre, to be delivered to the Society on or before the last Tuesday in December, 1816.

3. RAISING OAKS.

To the person who shall have raised, since the year 1812, the greatest number of oaks, not fewer than five thousand, either from young plants or acorns, in order to secure a succession of oak timber in this kingdom; the gold medal.

4. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates that there were on the land at least the number of young oak trees required, in a thriving condition, two years after the planting, with an account of the methods pursued in making and managing the plantation, to be produced to the Society on or before the first Tuesday in January, 1817.

5. ASCERTAINING THE BEST METHOD OF RAISING OAKS.

To the person who shall ascertain in the best manner by actual experiments, the comparative merits of the different modes of raising oaks for timber, either from acorns set on land properly dug or tilled, from acorns set by the spade or dibble, without digging or tillage, either on a smooth surface, or among bushes, fern, or other cover; or from young plants previously raised in nurseries, and transplanted; regard being had to the expense, growth, and other respective advantages of the several methods; the gold medal.

The *accounts*, and proper *certificates* that not less than one acre has been cultivated in each mode, to be produced to the Society on or before the last Tuesday in November, 1816.

6. CHESNUTS.

For having sown or set between the first of October, 1814, and the first of April, 1815, the greatest quantity of land, not less than six acres, with Spanish chesnuts, with or without seeds, cuttings, or plants of other trees, adapted to such soil, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

7. For the second greatest quantity, not less than four acres; the silver medal.

Certificates of sowing or setting, agreeably to the above conditions, and that there are not fewer than three hundred chesnut plants in a thriving state, on each acre, to be delivered to the Society on or before the first Tuesday in January, 1817.

8. ELM.

For having planted the greatest number of the English elm, not less than eight thousand, between the twenty-fourth of June, 1814, and the twenty-fourth of June, 1815, and for having effectually fenced and preserved the same, in order to raise timber; the gold medal.

9. For the second greatest number, not less than five thousand; the silver medal.

Certificates of having planted agreeably to the above conditions, that the plants were in a healthy and thriving state two years at least after making the plantation, and specifying the distance of the plants, to be delivered to the Society on or before the first Tuesday in April, 1817.

10. LARCH.

For having planted out, between the twenty-fourth of June, 1813, and the twenty-fourth of June, 1814, the greatest number of larch trees, not fewer than five thousand, and for having effectually fenced and preserved the same, in order to raise timber; the gold medal.

11. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates of the number of plants, that they were in a healthy and thriving state two years at least after they were planted

out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1816.

N. B. The larch trees may be planted either mixed with other trees, or by themselves, as may best suit the convenience of the planter.

12. ASH.

For having sown or set, in the year 1813, the greatest quantity of land, not less than six acres, with ash for timber, with or without seeds, cuttings, or plants, of such other trees as are adapted to the soil; the gold medal.

13. For the next greatest quantity, not less than four acres; the silver medal.

Certificates of the sowing or setting, agreeably to the above conditions, that there are not fewer than six hundred ash plants on each acre, in a thriving and healthy condition, two years at least after the sowing or setting, with a general account of the methods used in making the plantation; to be delivered to the Society on or before the last Tuesday in December, 1816.

14. FOREST TREES.

To the person who shall have enclosed and planted, or set, the greatest number of acres (not less than ten) of land, that is incapable of being ploughed, such as the borders of rivers, the sides of precipices, and any land that has too many rocks, or that is not calculated to re-pay the expense of tillage, owing to the surface being too hilly, mountainous, or otherwise unfit for tillage, with the best sorts of forest trees, namely, oak, Spanish chesnuts, ash, elm, beech, alder, willow, larch, spruce, and silver fir, with or without screens of Scotch fir adapted to the soil, and intended for timber trees, between the first of October, 1813, and the first of April, 1814; the gold medal.

15. For the second greatest quantity of land; not less than seven acres: the silver medal.

A particular *account* of the methods used in making and managing the plantations, the nature of the soil, the probable number of each sort of plants, together with proper *certificates* that they were in a healthy and thriving state two years at least after making the plantations, to be delivered to the Society on or before the second Tuesday in January, 1817.

N. B. With the above forest trees, the seeds, cuttings, or plants, of such other trees as are adapted to the soil, and proper for underwood, may or may not be intermixed.

16. NORWAY FIR SEEDLINGS.

To the person who shall have planted in the united kingdom, during the year 1815, the greatest number, not less than two thousand, of red wood and white wood, Norway fir seedling, at sufficient distances from each other to stand for timber trees; the gold medal.

Certificates of the number of plants, that they were in a thriving state two years at least after they were planted out, with a general account of the method used in making the plantation, to be delivered to the Society on or before the first Tuesday in December, 1816.

N. B. It is recommended to plant the seedlings of about three or four years growth, and in a moderately good soil, somewhat sheltered; the wood from the district of Christiania is esteemed the best for carpenters' and joiners' use: and for spars and upers the trees near to Long Sound are most valued.

17. WALNUT TREES.

For having planted the greatest number of walnut trees, not less than five hundred, between the 24th of June, 1814, and the 24th of June, 1815, and for having effectually fenced and preserved the same, in order to raise timber; the gold medal.

18. For the next greatest number, not fewer than three hundred; the silver medal.

Certificates of having planted agreeably to the above conditions, and that the plants were in a healthy and thriving state two years at least after making the plantations, and specifying the distance of the plants from each other, to be delivered to the Society on or before the first Tuesday in April, 1817.

19. SECURING PLANTATIONS OF TIMBER TREES AND HEDGE ROWS.

To the person who shall give to the Society the most satisfactory account, founded on experience, of the most effectual and least expensive method of securing young plantations of timber trees and hedge rows, from hares and rabbits, as well as sheep and large cattle, which at the same time shall be least subject to the depredations of wood-stealers; the silver medal.

The *accounts*, and *certificates* of the efficacy of the method, to be produced to the Society on or before the last Tuesday in December, 1816.

20. COMPARATIVE CULTURE OF WHEAT, BROAD-CAST, DRILLED, AND DIBBLED.

For the best set of experiments, made on not less than twelve acres, four of which to be sown broad-cast, four drilled, and four dibbled, the two latter in equidistant rows, in order fully to ascertain which is the most advantageous mode of cultivating wheat; the gold medal.

It is required that every operation and expense of each mode of culture be fully described; and that proper certificates of the nature and condition of the land on which the experiments were made, together with an *account* of the produce of the corn, the weight per bushel, and also of the straw, be produced to the Society on or before the first Tuesday in February, 1817.

21. BEANS.

To the person who, in the year 1816, shall discover and cultivate, either by the drill or dibbling method, on not less than five acres, a species of horse-beans or tick beans, that will ripen their seeds before the 21st of August; the silver medal.

It is required that a particular account of the bean, the cultivation, and the expense attending it, with proper *certificates* of the nature and condition of the land on which the experiments were made, together with an *account* of the produce, the weight per Winchester bushel, and a sample of not less than a peck, be produced to the Society on or before the last Tuesday in December, 1816. It is apprehended that if a bean should be brought into cultivation with the habits of hotspur, or other early peas, that it would in a great measure escape the danger arising from the collier insect, or other insects, and allow more time for the farmers to till the land for the subsequent crop of wheat. The *accounts* and *certificates* to be delivered on or before the last Tuesday in December, 1816.

22. PARSNIPS.

To the person who, in the year 1816, shall cultivate the greatest quantity of land, not less than five acres, with parsnips, for the particular purpose of feeding cattle or sheep; the gold medal.

Certificates of the quantity of land so cultivated, with a particular *account* of the nature of the soil and weight of the produce on sixteen perches, and also of the condition of the cattle or sheep fed with the parsnips, and the advantages resulting from the practice, to be produced to the Society on or before the second Tuesday in February, 1817.

23. BUCK WHEAT.

To the person who shall cultivate the greatest quantity of land with buck wheat, not less than thirty acres; the gold medal.

It is required that the time of sowing and reaping be noticed; also a particular *account* of the species, cultivation, and expense attending it, the manner of reaping it, thrashing it, and housing the grain; with proper *certificates* of the nature and condition of the land on which the experiments were made, and the name of the crop, if any, which the same land bore the preceding year, together with an *account* of the produce, and a sample of the seed, not less than a quart, be produced to the Society on or before the second Tuesday in January, 1817.

24. For the next greatest quantity, not less than fifteen acres, on similar conditions; the silver medal.

Information respecting its application to the feeding of cattle, hogs, and poultry, and other of its uses, is also desired. It is known to be particularly serviceable in furnishing honey to bees.

25. BEES WAX, AND HONEY.

To the person who shall erect, previous to the first day of September, 1816, an apiary, containing the greatest number of hives or boxes stocked with bees, not less than one hundred; the silver medal, or twenty guineas.

26. For the next greatest number, not fewer than fifty stocks; ten guineas.

Proper *certificates* of the number of stocks, and that they have been in the possession of the claimant during the preceding summer, to be produced to the Society on or before the first Tuesday in March 1817.

It is expected that the claimant will give such particular information on the subject, as may tend to benefit the public, and enable other persons to keep bees to advantage; also that improved methods be made use of in their management, and particularly that the bees be not destroyed in order to obtain their honey and wax.

27. RAISING GRASS SEEDS.

To the persons who shall raise the greatest quantity of each or any of the following named grass seeds, *viz.*—Meadow fox-tail (alopecurus pratensis), sweet-scented vernal grass (anthoxanthum odoratum), Timothy grass (phleum pratensis), meadow fescue grass (festuca pratensis), smooth-stalked meadow grass (poa pratensis), rough-stalked meadow grass (poa trivialis); the silver medal.

It is required that *certificates* from persons who have viewed them in a proper state, to indentify that they are one or other of the seeds above-mentioned, indicating clearly the particular species, and noticing the quantity produced of such seeds, free from weeds or mixture of other grasses, together with proper samples of the seeds, be produced to the Society on or before the first day of February, 1816.

28. PRESERVING TURNIPS.

To the person who shall discover to the Society the best and cheapest method of preserving turnips perfectly sound, and

in every respect fit for the purpose of supporting and fattening sheep and neat cattle during the months of February, March, and April; the gold medal.

It is required that a full and accurate *account* of the method employed, and the expense attending the process, together with *certificates* that the produce of four acres at the least have been preserved according to the method described, and applied to the feeding of sheep and neat cattle; that the whole were drawn out of the ground before the first day of February, in order to clear the greater part of it previous to its being prepared for corn, and to save the soil from being exhausted by the turnips; and also of the weight of an average sixteen perches of the crop; be produced to the Society on or before the last Tuesday in December, 1816.

29. For the next in quantity and merit, on not less than two acres; the silver medal.

30. PRESERVING CABBAGES.

To the person who shall discover to the Society the best and cheapest method of preserving drum-headed cabbages perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle during the months of February, March, and April; the gold medal.

31. For the next in quantity and merit, on not less than two acres; the silver medal.

Conditions the same as for preserving turnips, Art. 28.—And the *accounts* to be produced on or before the last Tuesday in December, 1816.

32. PRESERVING CARROTS, PARSNIPS, OR BEETS.

To the person who shall discover to the Society the best and cheapest method of preserving carrots, parsnips, or beets, perfectly sound, and in every respect fit for the purpose of supporting horses and fattening sheep and neat cattle, during the months of February, March, and April; the gold medal.

Conditions the same as for preserving turnips, Art. 28.—And the *accounts* to be delivered in on or before the last Tuesday in December, 1816.

33. For the next in quantity and merit, on not less than two acres; the silver medal.

34. POTATOES.

To the person who shall, in the year 1816, cultivate the greatest quantity of land which has not been used for the cultivation of potatoes for the space of twelve years past, not less than fifty acres, with potatoes of such qualities as to be fit for the use of the table in the months of April, May, and June, after their growth the preceding year; the gold medal, or thirty guineas.

35. For the next greatest number, not less than twenty acres; the silver medal, or fifteen guineas.

Proper *certificates*, along with other necessary particulars, to be delivered in to the Society on or before the first Tuesday in April, 1817.

36. These premiums are extended one year further on similar conditions.

37. PRESERVING POTATOES.

To the person who shall discover to the Society the best and cheapest method of preserving potatoes, two or more years, perfectly sound, without vegetating, and in every other respect fit for the purpose of sets and the use of the table, and consequently of supporting and fattening cattle; the gold medal, or thirty guineas.

It is required that a full and accurate *account* of the method employed, and the expense attending the process, with *certificates* that one hundred bushels at the least have been preserved according to the method described, and that one or more bushels of the same potatoes have been set, and produced a crop without any apparent diminution of their vegetative power, and also that they have been used at table, with entire satisfaction to the persons who eat of them, together with a sample of one bushel, be sent to the Society on or before the last Tuesday in December, 1816.

38. For the next greatest quantity, not less than fifty bushels; the silver medal.

39. MAKING MEADOW-HAY IN WET WEATHER.

To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of making meadow hay in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than fifty-six pounds of the hay; and *certificates* that at least the produce of six acres of land has been made according to the method described, and that the whole is of equal quality with the sample; to be produced on or before the first Tuesday in January, 1817.

40. HARVESTING CORN IN WET WEATHER.

To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of harvesting corn in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than two sheaves of the corn, and *certificates* that at the least the produce of ten acres has been harvested according to the method described, and that the whole is of equal quality with the samples; to be

produced on or before the first Tuesday in January, 1817.

41. GAINING LAND FROM THE SEA.

To the person who shall produce to the Society an account, verified by actual experiment, of his having gained the greatest quantity of land from the sea, not less than fifty acres, on the coast of Great Britain and Ireland; the gold medal.

Certificates of the quantity of land, and that the experiments were begun after the first of January, 1811, to be produced to the Society on or before the last Tuesday in December, 1816.

42. The same premium is extended one year further.

Certificates to be produced on or before the last Tuesday in December, 1817.

43. IMPROVING LAND LYING WASTE.

For the most satisfactory *account* of the best method of improving any one of the following soils, being land lying waste and uncultivated, *viz.* clay, gravel, sand, chalk, peat earth, or bog, verified by experiments of not less than fifty acres of land; the gold medal.

44. For the next greatest quantity, not less than thirty acres; the silver medal.

It is required, that the land, before such improvement, be absolutely uncultivated, and in a great measure useless, and that, in its improved state, it be enclosed, cultivated, and divided into closes.

Certificates of the number of acres, of the quality of the land so improved, with a full *account* of every operation and expense attending such improvement, the state it is in as to the proportion of grass to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1817.

45. MANURES.

For the most satisfactory set of experiments, to ascertain the comparative advantages of the following manures, used as top-dressings on grass and corn land, *viz.* soot, coal-ashes, wood-ashes, lime, gypsum, night-soil, or any other fit article; the gold medal.

It is required that the above experiments be made between two or more of the above-mentioned manures, and that no less than two acres of land be dressed with each manure.

An *account* of the nature of the soil, quantity, and expense of the manure and crops, with *certificates*, to be produced on or before the last Tuesday in February, 1817.

46. RAISING WATER FOR THE IRRIGATION OF LAND.

To the person who shall discover to the Society the cheapest and most effectual method of raising water in quantities sufficient to be beneficially employed for the purpose of irrigating land, superior to, and cheaper than any other method now in use; the gold medal, or fifty guineas.

A model, on a scale of one inch to a foot, with *certificates* that a machine at large, on the same construction, has been used, specifying the quantity of water delivered in gallons per hour, and the height to which it was raised, to be produced to the Society on or before the first of March, 1817.

47. PARING PLOUGH.

To the person who shall invent and produce to the Society a machine or plough for the purpose of paring land preparatory to burning, superior to any hitherto known, or in use for such purpose, and to be worked by not more than one man and two horses; the silver medal, or twenty guineas.

The machine, and *certificates* that at least ten acres have been pared by it in a proper manner, to be produced to the Society on or before the first of January, 1817.

48. MACHINE FOR DIBBLING WHEAT.

To the person who shall invent a machine, superior to any hitherto known or in use, to answer the purpose of dibbling wheat, by which the holes for receiving the grain may be made at equal distances and proper depths; the silver medal and ten guineas.

The *machine*, with *certificates* that at least three acres have been dibbled by it, to be produced to the Society on or before the second Tuesday in January, 1817.

49. MACHINE FOR REAPING OR MOWING CORN.

For inventing a machine to answer the purpose of mowing or reaping wheat, rye, barley, oats or beans, by which it may be done more expeditiously and cheaper than by any method now practised, provided it does not shed the corn or pulse more than the methods in common practice, and that it lays the straw in such manner that it may be easily gathered up for binding; the gold medal.

The *machine*, with *certificates* that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1816. Simplicity and cheapness in the construction of this and the preceding machine, will be considered as principal parts of their merit.

50. THRASHING MACHINE.

To the person who shall invent a machine by which corn of all sorts may be thrashed more expeditiously, effectually, and at a less expense, than by any method now in use; the gold medal.

The *machine* or a model, with proper *certificates* that such a machine has been usefully applied, that at least thirty quarters have been thrashed by it, and of the time employed in the operation, to be produced to the Society on or before the last Tuesday in February, 1817.

51. DESTROYING THE GRUB OF THE COCKCHAFER.

To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the grub of the cockchafer, or of preventing or checking the destructive effects which always attend corn, peas, beans, and turnips, when attacked by those insects; the gold medal.

The *accounts*, with proper *certificates*, to be produced on or before the first Tuesday in January, 1817.

52. DESTROYING WORMS.

To the person who shall discover to the Society, an effectual method, verified by repeated and satisfactory trials, of destroying worms, or of preventing the destructive effects they occasion on corn, beans, peas, or other pulse; the silver medal.

The *accounts*, with proper *certificates*, to be produced to the Society, on or before the first Tuesday in January, 1817.

53. DESTROYING THE FLY ON HOPS.

To the person who shall discover to the Society an easy and efficacious method of destroying the fly on hops, superior to any hitherto known or practised, on not less than four acres of hop ground; the gold medal.

Accounts and *certificates* to be delivered to the Society on or before the first Tuesday in February, 1817.

54. PREVENTING THE BLIGHT, OR RAVAGES OF INSECTS, ON FRUIT TREES AND CULINARY PLANTS.

To the person who shall discover to the Society the most effectual method of preventing the blight or ravages of insects on fruit trees and culinary plants, superior to any hitherto known or practised, and verified by actual and comparative experiments; the gold medal.

The *accounts*, with proper *certificates*, to be delivered to the Society on or before the second Tuesday in December, 1816.

55. FOR SCRAPING THE BARK OF FRUIT TREES.

To the person who shall send to the Society the best accounts of experiments made by scraping the bark of fruit trees, according to the plan recommended by Sir John Sinclair, in his Treatise on the subject; the silver medal.

Certificates that the experiments have succeeded, to be sent to the Society on or before the first Tuesday in March, 1817.

56. CURE OF THE ROT IN SHEEP.

To the person who shall discover to the Society the best and most effectual method of curing the rot in sheep, verified by repeated and satisfactory experiments; the gold medal.

It is expected that the candidates furnish accurate *accounts* of the symptoms and cure of the disease, together with the imputed cause thereof, and the actual or probable means of prevention, which, with proper *certificates*, must be delivered to the Society on or before the first Tuesday in February, 1817.

57. CURE OF THE FOOT-ROT IN SHEEP.

To the person who shall discover to the Society the best and most effectual method of curing the foot-rot in sheep; the silver medal.

It is required that the cure be ascertained by repeated and satisfactory experiments, and the method of performing it be verified by proper *certificates*, delivered to the Society on or before the first Tuesday in February, 1817.

58. PREVENTING THE ILL EFFECTS OF FLIES ON SHEEP.

To the person who shall discover to the Society the most effectual method of protecting sheep from being disturbed and injured by flies; the silver medal.

It is required that the method be ascertained by repeated experiments, and that a *certificate* of its efficacy be delivered to the Society on or before the first Tuesday in December, 1816.

59. PROTECTING SHEEP.

To the person who, in the year 1815, shall have protected the greatest number of sheep, not fewer than one hundred, by hovels, sheds, or any other means, and give the most satisfactory account, verified by experiment, of the advantages arising from the practice of protecting sheep from the inclemency of the weather, by hovels, sheds, or any other means; the gold medal.

A particular *account* of the experiments made, with the advantages arising therefrom, together with the expense, and *certificates* of its utility, to be produced to the Society on or before the first Tuesday in March, 1817.

N. B. It is required that the *certificates* shall specify the length of time the sheep were so protected, and the manner in which they were maintained during that time; to-

gether with the general method of managing them.

60. CULTURE OF HEMP.

The Society, wishing to encourage the growth of hemp for the use of the Navy in every part of the united Empire, offer to the person who shall have sown with hemp, in drills at least eighteen inches asunder, the greatest quantity of land in any part of the United Empire, not less than fifty acres statute measure, in the year 1815, and shall have at the proper season caused to be plucked the summer hemp, (or male hemp bearing no seed) and continue the winter hemp (or female hemp bearing seed) on the ground until the seed is ripe; the gold medal.

61. To the person who shall sow with hemp, in drills at least eighteen inches asunder, the next greatest quantity of land in any part of the United Empire, not less than twenty-five acres, statute measure, in the year 1816, and shall at the proper season cause the same to be plucked as abovementioned; the silver medal.

Certificates of the number of acres, of the distance of the drills, of the plucking of the hemp, with a general *account* of the soil, cultivation, and produce, to be delivered to the Society, along with fourteen pounds of the hemp and two quarts of the seed, on or before the second Tuesday in January, 1817.

62. FEEDING OF CATTLE.

For the best experiments on stall-feeding of cattle (not less than five head), to be continued for the space of twelve months, in order to prove the earliest maturity and greatest propensity to fatten, of the most approved breeds of cattle in Great Britain, specifying the nature of the food given, together with the daily consumption of each beast, with its weekly increase in weight, and such other observations as may be deemed of consequence; the gold medal.

A full *account* of the methods employed, and of the expenses attending the same, and *certificates* of the sundry matters stated, to be produced on or before the second Tuesday in January, 1817.

PREMIUMS FOR DISCOVERIES AND IMPROVEMENTS IN CHEMISTRY, DYEING, AND MINERALOGY.

63. PRESERVING SEEDS OF VEGETABLES.

For the best method of preserving the seeds of plants in a state fit for vegetation a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial, to be communicated to the Society on or before the last Tuesday in December, 1816; the gold medal, or thirty guineas.

64. PREVENTING THE DRY-ROT IN TIMBER.

To the person who shall discover to the Society the cause of the dry-rot in timber, and disclose a certain method of prevention superior to any hitherto known; the gold medal, or thirty guineas.

The *accounts* of the cause and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the last Tuesday in Dec. 1816.

65. PRESERVING SALTED PROVISIONS FROM BECOMING RANCID OR RUSTY.

To the person who shall discover to the Society the best, cheapest, and most efficacious method of preserving salted provisions from becoming rancid or rusty; the gold medal, or thirty guineas.

A full *description* of the method, with proper *certificates* that it has been found on repeated trials to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1817.

66. REFINING WHALE OR SEAL OIL.

For discloeing to the Society an effectual method of purifying whale or seal oil from the glutinous matter that incrusts the wicks of lamps, and extinguishes the light though fully supplied with oil; the gold medal, or fifty guineas.

It is required that the whole of the process be fully and fairly disclosed, in order that satisfactory experiments may be made by the Society to determine the validity of the claim; and *certificates* that not less than twenty gallons have been purified according to the process delivered in, together with two gallons of the oil in its unpurified state, and two gallons so refined, to be produced to the Society on or before the second Tuesday in February, 1817.

67. MANUFACTURING TALLOW CANDLES.

To the person who shall discover to the Society a method of hardening or otherwise preparing tallow, so that candles may be made of it which will burn as clear and

with as small a wick as wax candles, with out running, and may be afforded at a less expense than any at present made with spermaceti; the gold medal, or fifty guineas.

Certificates that 112lb. of such tallow have been made into candles, and 12lb. of the candles made thereof, to be produced to the Society on or before the second Tuesday in January, 1817.

68. CANDLES FROM RESIN, OR OTHER SUBSTANCES.

To the person who shall discover to the Society the best method of making candles of resin, or any other substance fit for common use, at a price much inferior to those made of tallow only; the gold medal, or thirty guineas.

Six pounds at least of the candles so prepared, with an *account* of the process, to be delivered to the Society on or before the last Tuesday in December, 1816.

69. INCREASING STEAM.

To the person who shall invent and discover to the Society a method, verified by actual experiments, of increasing the quantity or force of steam in steam-engines, with less fuel than has hitherto been employed, provided that in general the whole amount of the expenses in using steam engines may be considerably lessened; the gold medal, or fifty guineas.

To be communicated to the Society on or before the first Tuesday in January, 1817.

70. SUBSTITUTE FOR TAR.

To the person who shall invent and discover to the Society the best substitute for Stockholm tar, equal in all its properties to the best of that kind, and prepared from materials the produce of the United Kingdom and its Colonies; the gold medal, or one hundred guineas. A quantity of the substitute, not less than one hundred weight, with *certificates* that at least one ton has been manufactured, and that it can be afforded at a price not exceeding that of the best foreign tar, together with an *account* of the process, to be delivered to the Society on or before the first Tuesday in March, 1817.

N. B. Considerable quantities of tar are produced in Sweden and Norway from the roots of fir trees burnt for that purpose.

71. TURPENTINE FROM THE SCOTCH FIR, OR PINUS SYLVESTRIS.

For the greatest quantity of turpentine, not less than two hundred weight, prepared in Great Britain, from that species of fir called the Scotch fir, or Pinus sylvestris, Linn.; the gold medal.

Certificates of the turpentine being prepared from such trees of British growth, together with fifty-six pounds of the turpentine, to be delivered to the Society on or before the second Tuesday in January, 1817.

72. For the next greatest quantity prepared, not less than one hundred weight, on similar conditions; the silver medal.

N. B. The Society being in possession of the method practised for extracting turpentine from trees whilst growing, and of samples so procured, information will be given upon that subject, on application for that purpose, at the Society's house.

73. PREPARATION OF TAN.

To the person who shall prepare, in the most concentrated form, so as to be easily portable, and at a price applicable to the purposes of manufacturers, the largest quantity, not less than one hundred weight, of the principle called *tannin*, which abounds in oak bark and many other vegetable substances; the gold medal, or thirty guineas.

Certificates of the superior quality of the quantity so prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1817.

74. INDELIBLE INK.

To the person who shall discover to the Society a method of making a black ink proper for writing, superior to any at present known, indestructible by chemical applications, and not dearer than that which is now in common use; the silver medal, or fifteen guineas.

Certificates that not less than two gallons of such ink have been actually prepared, and found to possess the qualities above mentioned, with a full detail of the process of making it, and two quarts of the ink to be delivered to the Society on or before the second Tuesday in January, 1817.

75. PREPARATION OF A RED STAIN FOR COTTON CLOTH.

To the person who shall communicate to the Society the cheapest and most effectual method of printing or staining cotton cloths with a red colour, by an immediate application of the colouring matter to the cloth, equally beautiful and durable with the red colours now generally procured from decoctions of madder; the gold medal, or fifty guineas.

Certificates that the above process has been advantageously used on ten pieces of calico, each twenty-one yards or upwards in length; one piece of the calico so printed, one pound of the colour, and a full *account* of the preparation and application, to be produced to the Society on or before the second Tuesday in January, 1817.

76. PREPARATION OF A GREEN COLOUR FOR PRINTING COTTON CLOTH.

To the person who shall communicate to the Society the best and cheapest method of

printing with a full green colour on cotton cloth, by an immediate application of the colouring matter from a wooden block to the cloth, equally beautiful and durable as the colours now formed from the complicated process of the decoction of weld, and the solutions of indigo; the gold medal, or fifty guineas.

Certificates and conditions as for Premium 75.

77. RENDERING MUSLIN LESS COMBUSTIBLE.

To the person who shall discover to the Society a method of rendering muslin less combustible, to be effected by a cheaper and more effectual mode than any hitherto known; the silver medal.

Specimens of the muslin so prepared, with a full account of the process employed for the purpose, to be produced to the Society on or before the first Tuesday in February, 1817.

N. B. It is expected that the means employed shall neither injure the quality of the muslin, stain it, nor damage any print or dye with which it may be coloured.

78. WHITE SUBSTANCE FOR THE BASIS OF PAINT.

To the person who shall produce to the Society the best white substitute, superior to any hitherto known, for the basis of paint, equally proper for the purpose as the white-lead now employed; such substitute not to be of a noxious quality, and to be afforded at a price not materially higher than that of white-lead, the gold medal, or one hundred guineas.

A quantity of the substitute, not less than 50lb. weight, with an *account* of the process used in preparing it, and *certificates* that at least one hundred weight has been manufactured, to be produced to the Society on or before the first Tuesday in January, 1817.

79. PERMANENT WHITE PAINT FOR THE USE OF ARTISTS.

To the person who shall produce to the Society a white paint, superior to any hitherto known, and which is not liable to be discoloured by exposure to light or sulphurated hydrogen gas; the gold medal, or thirty guineas.

A full account of the process, and 1lb. of the colour to be produced to the Society, on or before the second Tuesday in January, 1817.

80. RED PIGMENT.

To the person who shall discover to the Society a full and satisfactory process for preparing a red pigment, fit for use in oil or water, equal in tone and brilliancy to the best carmines and lakes now known or in use, and perfectly durable; the gold medal, or fifty guineas.

One pound weight of such colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1817.

N. B. It is not required that the colour should resist the action of fire, or chemical applications, but remain unaltered by the common exposure to strong light, damps, and noxious vapours.

81. ULTRAMARINE.

To the person who shall prepare an artificial ultramarine, equal in colour, brilliancy, and durability, to the best prepared from lapis lazuli, and which may be afforded at a cheaper rate; the gold medal, or thirty guineas.

The conditions are the same as in the preceding Premium for the red pigment.

82. BLUE PIGMENT FROM IRON.

To the person who shall invent, and discover to the Society, the best blue pigment from iron, superior to Antwerp or Prussian blue in colour and durability, fit for use in oil or water, which may be afforded at a cheap rate; the gold medal, or thirty guineas.

One pound weight of the colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1817.

N. B. A blue substance much resembling ultramarine, is frequently found amongst the scoriæ of blast furnaces where iron is reduced.

83. DESTRUCTIVE EFFECTS FROM MOTHS.

To the person who shall discover to the Society a cheap, easy, and effectual method, verified by repeated and satisfactory trials, of preventing the destructive effects occasioned by moths and other insects, in furs, woollens, and other articles, superior to any hitherto known or practised; the silver medal, or fifteen guineas.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1817.

84. STATUARY MARBLE.

To the person who shall discover, within great Britain or Ireland, a quarry of white marble fit for the purposes of statuary, and equal in all respects to those kinds now imported from Italy; the gold medal, or one hundred guineas.

A block of at least three feet in length, two in height, and two in width, with an account of the situation of the quarry, and *certificates* of its possessing considerable extent, to be produced to the Society on or before the first Tuesday in February, 1817.

N. B. In order to prevent useless expense or trouble to the claimant in forwarding so large a block, the Society will

be ready to examine any smaller specimen of the marble, and express their opinion of its value to the candidate before the block required by the above premium is produced.

85. PREPARATION OF SULPHURIC ACID, FROM SULPHUR, WITHOUT THE USE OF ANY NITRIC SALT.

To the person who shall prepare the largest quantity (not less than one ton) of sulphuric acid from sulphur, without any nitric salt, of a specific gravity not inferior to the best sulphuric acid of commerce; the gold medal, or fifty guineas.

Certificates that not less than the above quantity of such an acid has been prepared, together with a sample, to be produced to the Society on or before the first Tuesday in January, 1817.

86. PREPARATION OF ANY ALKALINE OR EARTHEN NITRATE.

To the person who shall prepare, in Great Britain, the largest quantity, not less than one hundred weight, of any salt of nitric acid, with either earths or alkalies, by a method superior to, and as cheap as those hitherto practised; the gold medal, or one hundred guineas.

Certificates of the above quantity having been prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1817.

87. FINE BAR IRON.

To the person, in Great Britain, who shall make the greatest quantity of bar-iron, not less than ten tons, with coak, from coak pigs, equal in quality to the best iron imported from Sweden or Russia, and as fit for being converted into steel; the gold medal, or fifty guineas.

Samples, not less than one hundred weight, with *certificates* that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1817.

88. PRESERVING IRON FROM RUST.

To the person who shall invent and discover to the Society a cheap composition, superior to any now in use, which shall effectually preserve wrought iron from rust; the gold medal, or fifty guineas.

A full description of the method of preparing the composition, with *certificates* that it has stood at least two years unimpaired, being exposed to the atmosphere during the whole time, to be produced to the Society, with ten pounds weight of the composition, on or before the first Tuesday in January, 1817.

89. REFINING BLOCK TIN.

To the person who shall discover to the Society the best method of purifying or refining block-tin, so as to render it fit for the finest purposes to which grain-tin is now applied, and not materially higher in price; the gold medal, or fifty guineas.

Certificates that not less than three tons have been so refined or purified, with a full detail of the process, and a quantity, not less than one hundred weight, of the tin so refined, to be produced to the Society on or before the first Tuesday in January, 1817.

90. GLAZING EARTHEN-WARE WITHOUT LEAD.

To the person who shall discover to the Society, the cheapest, safest, most durable, and most easily fusible composition, fit for the purpose of glazing the ordinary kinds of earthen-ware, without any preparation of lead, and superior to any hitherto in use; the gold medal, or thirty guineas.

Specimens of the ware so glazed, with proper *certificates* of its having succeeded, and a sample of the materials made use of, to be produced to the Society on or before the first Tuesday in February, 1817.

91. COBALT, ZAFFRE, AND SMALT.

For the discovery of a mine of cobalt in Great Britain or Ireland, that will produce a sufficient quantity of the mineral, of good quality, to supply a manufacture of zaffre, or smalt; the gold medal, or thirty guineas.

Certificates that at least one ton of the ore has been raised; and five pounds of zaffre, and ten pounds of smalt made therefrom, to be produced to the Society on or before the last Tuesday in March, 1817.

N. B. It appears from the minutes of the Society, in 1755, that a discovery of cobalt was made at or near Truro in Cornwall, but not a sufficient quantity of ore found to answer the desired purpose.

92. REFINING COPPER FROM THE ORE.

To the person who shall discover to the Society the best method of separating, purifying, and refining copper from the ore, so as to render it fit for those purposes to which fine copper is now applied, and by a process superior to any hitherto known or in use; the gold medal, or fifty guineas.

Certificates that not less than three tons have been so prepared or refined, and a quantity not less than one hundred weight of the copper so refined, to be produced to the Society on or before the first Tuesday in February, 1817.

93. PREVENTING THE ILL EFFECTS OF SMELTING ORES.

To the person or persons who shall invent and discover to the Society the

most effectual method or methods of preventing the ill effects arising to vegetation and animal life, from the sulphureous arsenical, or other noxious fumes disengaged in smelting the ores of copper, zinc, lead, tin, iron, &c. in the large way, and if possible, of converting those pernicious fumes into useful purposes, in a manner superior to any hitherto known or in use; the gold medal, or fifty guineas.

It is required that a full *account* of the process employed, with *certificates* of its being successfully carried into effect, be produced to the Society on or before the first Tuesday in March, 1817.

94. MINERALOGICAL COUNTY MAPS.

To the person who shall complete and publish the best mineralogical map of any county in the united kingdom, on a scale of not less than one inch to a mile, containing an account of the situation of the different mines therein, and describing the kinds of minerals thence produced, with sections of the strata; the gold medal, or fifty guineas.

Certificates of the accuracy of such maps, together with the maps, to be produced to the Society on or before the first Tuesday in February, 1817. The maps to remain the property of the Society.

95. MINERALOGICAL MAP OF IRELAND.

To the person who shall complete and publish an accurate mineralogical map of Ireland, on a scale of not less than five miles to an inch, containing particulars described in the foregoing premium; the gold medal, or fifty guineas.

96. MINERALOGICAL MAP OF SCOTLAND.

The same premium is offered for a mineralogical map of Scotland, on similar conditions.

97. NATURAL HISTORY.

To the author who shall publish, in the year 1816, the natural history of any county in the United Kingdom; the gold medal, or fifty guineas.

It is required that the several natural productions, animal, vegetable, and mineral, peculiar to the county, or found therein, be carefully and scientifically arranged and described, in order that the public may be enabled to judge what arts or manufactures are most likely to succeed in such county. The work to be delivered to the Society on or before the last Tuesday in January, 1817, and a copy to be the property of the Society.

PREMIUMS IN POLITE ARTS.

98. HONORARY PREMIUMS FOR PAINTINGS OR DRAWINGS BY NOBILITY.

For the best original painting or drawing of any kind, by young gentlemen under the age of twenty-one, sons or grandsons of peers or peeresses in their own right, of Great Britain or Ireland; the gold medal.

99. For the best copy, on similar conditions; the silver medal.

100—101. The same premiums will be given on the like conditions, to young ladies, daughters or grand-daughters of peers or peeresses in their own right of Great Britain or Ireland.

102. HONORARY PREMIUMS FOR PAINTINGS OR DRAWINGS BY GENTLEMEN.

For the best original painting or drawing of any kind, by young gentlemen under the age of twenty-one; the gold medal.

103. For the best copy, on similar conditions; the silver Isis medal.

104—105. The same premiums will be given for drawings by young ladies.

N. B. As the foregoing honorary premiums are intended only for such of the nobility and gentry as may hereafter become patrons or patronesses of the arts; persons professing any branch of the polite arts, or any business dependent on the arts of design, or the sons and daughters of such persons, will not be admitted candidates in the above classes, including 98 to 105.

106. For the best original historical painting or drawing, by persons of either sex, under the age of twenty-five; the gold medal.

107. For the best copy of an historical painting or drawing, by persons of either sex, under the age of twenty-one; the silver medal.

108. For the best original landscape, either in oil or water colours, by persons of either sex, under the age of twenty-five; the gold Isis medal.

109. For the best original landscape in oil or water colours, by persons of either sex, under the age of twenty-one; the silver medal.

PAPERS

IN

AGRICULTURE.

The GOLD MEDAL *of the Society, the Premium offered in Class* 5, *was this Session adjudged to her Grace the Duchess of* RUTLAND, *of Belvoir Castle, for raising Oaks. The following Communications on the Subject were received from Mr.* MATTHEW POUND, *her Grace's Woodman.*

SIR,

ON behalf of her Grace the Duchess of Rutland, as a candidate for a premium for ascertaining the best method of raising oaks, agreeably to the rules of the Society of Arts, &c., premium No. 5, for the Year, 1815, I am directed by her Grace to communicate to the Society the following comparative experiments on the best method of raising oaks, and which have been adopted in the nurseries and land set apart for the purpose, under her immediate inspection.

No. I.

In respect to the best method of raising and growing oaks for timber, the following offers itself, and which has been successfully tried on her Grace's land. Previous to sowing the acorn the land was pared and burnt, and buck-wheat sown the first year: the second year (1807) the acorns were sown in drills, three feet apart, after the land had been once ploughed; the rows were hoed the two first years: the third, fourth and fifth years potatoes were planted between the rows, one row only between each row of oaks: the second, third and fourth years the trees were thinned to two feet apart in the rows; the third crop of potatoes being one year after the last thinning. The next year being the sixth year after sowing the acorns, the potatoe-crop ceased, as the branches had formed too much shade: had not this been the case, the potatoe-crop would have been continued, as the principal object in view is to keep up a continual *smothering crop*, until the oaks become *such* themselves: after that period, there is nothing to impede a most rapid growth, forming straight, clean, handsome bolls; and, by proper attention to thinning at certain periods, soon become a valuable plantation of superior oaks:—These oaks having been sown only eight years, many of them are *eleven* feet high, and *ten* inches in circumference; and so fine and clean in their growth, that every judge who sees them is surprised at their progress; and this is certainly owing to the method pursued.

No. II.

The second comparative experiment was made on *grass land*. The land was ploughed *once*, and the acorns sown in drills, five feet apart, and hoed the two first years; after this

this period, there was nothing more done than to cut down the tall weeds with a reaping-hook once in each year, for four years; these trees were thinned to three feet apart in the rows, after the second, third and fourth years of their growth: these trees were sown in 1808, and are now six feet high, of a healthy, strong appearance, but not so fine as No. 1. by a very great difference, and are not likely to advance so rapidly.

No. III.

The third comparative experiment was by planting; the land was previously ploughed and sown with buck wheat. The land being clean, no weeds had arisen through the winter; this piece of land was about seven acres, and it was desirable to plant the whole with oaks, having a quantity of two and three years seedling oaks, both in nursery beds and in drills; I was induced, through the lateness of the season and scarcity of hands, to plant these oaks *with the plough*; this so far succeeded, that in six days I had planted about half the land with about 100,000 oaks in rows, at three feet distance, and one foot plant from plant. My object in planting one foot plant from plant was to grow them from two or three years, then to thin them to three feet, which has been done; they now stand three feet apart, or thereabouts; these trees were hoed the two first summers, since which nothing has been done but thinning them to three feet, and cutting down the tall weeds once in the year for the four years after; this is now a very healthy thriving plantation, and has every appearance of making a good oak wood, the plants being on an average four feet high.

No. IV.

The fourth comparative experiment was made on the remaining half of the abovementioned seven acres, and planted in every respect the same way, with only this difference, namely, the acorns were sown in the year 1808 in the nursery, in beds, the common way. From the bad opinion I had of raising oaks in nursery beds, and then quartering them out for two, three, or four years, previous to making them into a plantation, induced me to try this method, which has fully answered my expectation. These oaks on an average are three feet high, and perfectly healthy; they will, no doubt, make a good oak wood. Their not being higher than three feet must be attributed to their having been raised in nursery beds, which rendered them, *when planted*, more weak and delicate than those raised *in drills*. So fully convinced am I of this, that I now sow all in drills.

No. V.

In the fifth comparative experiment, two acres were planted with oaks *only*, at four feet distance each way; this was done by digging holes, and planting the seedling plants at three years old, one plant in each hole; these plants were the thinnings of No. 1. The land was allowed to be planted by poor persons with potatoes, one row *only* between each row of oaks; this practice has been followed for three years, and the oaks have so increased in their growth as almost to exclude the air from the potatoes, and will next year become compleat *smothering* crop: This desirable circumstance has been effected with *oaks only*, without a mixture of any other trees, in four years; and, there is no doubt, that the plants will advance

vance at a most rapid rate, many of this year's shoots being two feet long, and the plants in general seven feet high.

From the observations I have been able to make from the above experiments, I consider the *first* and the *last methods* as the best: the first method, No. 1., is by sowing the acorns where they are to remain, and after hoeing the rows two years, to plant potatoes, one row only between each row of oaks, for three years; decidedly in my opinion the *best method*, as the facts themselves will prove. The benefit of the oaks from planting potatoes is incalculable; for, from the above experiments, and from others made at the same time, and with the same seedling oaks, planted with a mixture of larch, spruce, beech, birch, and other forest trees, and also with oaks only. In all cases, I have found that potatoes between the rows are so superior to all other methods, that the oaks will actually grow as much the first four years with them, as in six without them.

It appears, then, that the great secret in raising plantations of oaks is, to get them to advance rapidly the first eight years from seed, or the first five years from planting, so as the heads of the trees are compleatly united and become a *smothering crop:* after this is effected, the trees will strive to outgrow each other, and will advance in height rapidly; they will be clean straight trees to any given height: experiments have proved the fact, which may be verified by viewing Belvoir.

How easy is it then to have fine plantations for oaks *only*, without mixture, as the *smothering crop* can be produced the third year after sowing the acorns, and the first year after planting, by *the potatoe crop*, until the oaks themselves become a smothering crop. If the seedlings are carefully thinned, and as carefully planted, all doubts of obtaining a

fine plantation of oaks are at an end. By the method of planting I have described, I have found that not more, on an average, than one in five hundred die.

I beg leave to state particularly to the Society, that the foregoing experiments of growing oaks only, without a mixture of other forest trees, were made with a view to controvert the opinion generally, I believe, entertained, that a good oak plantation could not be raised or obtained without a mixture of firs or other trees to shelter or protect them in their infant state, as it appeared evident to me, from the plantations around Belvoir, that the oaks were uniformly *worse* in the mixed plantations, than in those of *oak only*. Oaks, in my opinion, are much injured by any, or all sorts of trees growing near them, and therefore are not *ultimately* promoted in their growth by being planted in mixed plantations.

The annexed Certificate, signed by experienced and respectable nurserymen and gardeners, who have viewed the whole of the plantations mentioned in my communication, will shew the condition they are in, and that what is stated is correct.

Any further explanation which may be deemed necessary will be readily furnished, by addressing a line to me, nurseryman, Belvoir Castle, near Grantham, Lincolnshire.

I am, Sir,

Your most obedient Servant,

MATTHEW POUND.

Belvoir Castle, 23d Nov. 1815.

To C. Taylor, M. D. Sec.

Certificate.

CERTIFICATE.

WE, the undersigned, having viewed the plantations referred to in the preceding report, do hereby certify, that they are healthy in every respect as stated; particularly No. 1., in which the trees are very fine, clean, and large, much larger than any we have seen of their age; and, it is our opinion, that this has been effected by the treatment pursued, which appears to us to be the best method of raising oak timber: the whole are well fenced with posts, and rails, and young hawthorn hedges, planted the common way with ditches.

(Signed) The REV. SIR JOHN THOROTON.
WILLIAM WOOD, Nurseryman, Grantham.
WILLIAM WOOD, Jun. Do. Do.
WILLIAM DOLBY, Gardener to SIR W. E. WELBY, Bart. Denton.

In consequence of the foregoing statement, the Secretary was ordered to apply to Mr. POUND for further particulars, describing the quantity of ground in each experiment, and the probable expence of cultivation; in reply to which the following Communication was received.

SIR,

I RECEIVED your letter on the seventh of March, respecting some further explanation upon the subject of a claim on behalf of her Grace the DUCHESS of RUTLAND, "ascertaining the best method of raising oaks for timber," (see the List of the Society's Premiums, Article V.) I beg leave, in addition to my former report, to transmit the following particulars.

No. I.

This land is situated rather low, and in the ancient Belvoir Chase, in that part set out for woodlands by the Commissioners of the late enclosure. The land, from the number of oaks, shoots, or roots, remaining after cutting large oak timber for centuries past, and the quantity of fine oak timber now standing, gives an original appearance to this place, presenting the rough surface it has possessed for centuries; being "*such land as is not calculated for the purposes of husbandry!*"

The method pursued to reduce this land for sowing acorns, was to pare it as well as the roots would permit, and burn the surface. The ashes, which were a plentiful dressing, were spread on the surface, and ploughed as well as the nature of such rooty ground would allow; that part, which could not be ploughed round the large roots, was spitled over with the spade, and sown with buck-wheat; the crop alone was sufficient to pay the expences hitherto incurred. Being prepared by the previous crop of buck-wheat, the land was ploughed and spitled with the spade as before, finding it impracticable to drill it with the plough. The hoe and line were introduced, and drills made at three feet distance. The acorns were sown in the year 1807. The two following years the ground was hoed twice each summer; the third and fourth years, the oaks were thinned to two feet distance in the rows. Potatoes were planted the third, fourth and fifth years, one row only, between the rows of oaks; since which nothing has been done except cutting the long weeds with a reaping-hook once in the summer for two years more.

This

This piece of land contains one and a-half acres, and the qualities of the soil I will immediately describe.

The surface, a strong hazel loam approaching to clay, from twelve to eighteen inches deep.

The substratum, altering as it deepens, to a grey clay, and from that to a blue, at the depth of six feet. After this, strong blue clay, to a great depth.

Expence of the above Mode per Acre.

	£.	s.	d.
Ploughing per acre once - - -	0	12	0
Digging round the roots - - -	0	5	0
Drilling the acorns with hoe and line -	0	10	0
Hoeing the land two years, twice each summer, at 5s. - - - - -	1	0	0
Cutting the weeds after the potatoe crop had ceased, two years at 2s. 6d. - -	0	5	0
	£2	12	0
Deduct rent for planting potatoes, three years, at 4s. per acre - - -	0	12	0
Total expence per acre	£2	0	0

No. II.

The situation and soil of this piece of land are similar to No. 1; to which I beg leave to refer. The land contains about two acres, which being ploughed, the acorns were sown in drills, at five feet distance. The two following years it was hoed twice each summer, and for the ensuing four years, the tall weeds were cut once each summer; since which nothing more has been done.

Expence

Expence per Acre.

	£.	s.	d.
Ploughing at 12s. per acre - - -	0	12	0
Drilling with hoe and line - - -	0	10	0
Hoeing two years, twice each summer, at 5s. each time - - - - -	1	0	0
Cutting weeds 4 years, at 2s. 6d. per summer	0	10	0
Total expence per acre - -	£2	12	0

The thinning of the above seedling oaks is not charged in this account, as I have invariably charged the new plantations with the taking up the young trees.

No. III.

This land was prepared by a previous crop of buck-wheat, and being clear of weeds, the oaks were planted with the plough at intervals of three feet, or as near that distance as possible with the plough, having opened four ridges or lands, laying the two first bouts back to back, making four furrows of nine inches each, which form the two first rows. Six men and six boys, stationed at proper distances, proceed to plant the oaks; the man with a broad spade strikes it into the side of the furrow last thrown up, with one side in the open furrow obliquely, and the other in the earth thrown up. The moment the spade is chopped in, the boy inserts the plant in the opening, with the top root extending into the bottom of the furrow. As the man proceeds every chop he makes, his foot next the plants closes a former opening, and closes the earth to the plant. During this operation the plough is making other furrows on another land, to be ready for the planters, thus continuing until the work is ended. The two

first

first summers the land was hoed twice in each; the third, fourth, fifth, and sixth, the long weeds were cut once in each. The plants were raised in drills, and were the thinnings of No. 2. They are fine and healthy.

This piece of land contains the half of seven acres, and is situate on rising ground.

The Qualities of the Soil.

The surface red, rather light, mixed with a soft red earthy stone, generally small, many of which may be crushed with the foot, from eight to eighteen inches deep.

The substratum consists of the same red earth, mixed with large loose stones, being one half stone to the depth of six feet. Afterwards an inferior iron-stone, composed of loose rock, from four to six feet in thickness. At the depth of twelve feet, a white marley clay to a great depth.

Expence per Acre.

	£.	s.	d.
Ploughing per Acre, at 12s. -	0	12	0
Six men, at 2s.—Six boys, at 1s. -	0	18	0
Hoeing twice, two years, at 5s. each	1	0	0
Cutting weeds 4 years, at 2s. 6d. -	0	10	0
One man taking up oak from No. 2	0	2	6
Total expence per acre	£3	2	6

No. IV.

The other part of this same field, containing the half of the before-mentioned seven acres, was planted with the plough similar to No. 3, with plants taken from nursery beds. The object was to ascertain the best method of raising

raising oaks, either by drills or nursery beds, and afterwards transplanting. These seven acres being set apart for planting, and divided half to No. 3, the other half to No. 4, and treated in all respects like the former. Accordingly, the surface, substratum, and other particulars agreeing with No. 3, to which I beg leave to refer. From observations on the above, I am fully convinced, that sowing oak in drills is a better method than sowing them in beds, in which they contract a weakness which must take some years to recover to a state of perfect health and strength.

No. V.

Is situate rather low, and has such an uneven surface, that no attempt apparently has ever been made to bring the lands into tillage, being found in its original state, and according to the rules of the society, "*are such lands as are not calculated for the purposes of husbandry.*" These lands are part of a plantation of twenty-six acres, twenty-four acres being planted as a mixed plantation, and the two acres as a specimen of oaks *only*,—a living evidence of the best method of growing oak timber; the circumstances of soil and situation being similar.

The very uneven surface of this land made it impracticable for ploughing, therefore it was determined to plant it, by digging holes in the common way; when done, the ground was immediately let to labourers at 4s. per acre, for planting potatoes. The object to be obtained in letting the land so low, was, to induce the labouring poor to plant the whole with potatoes, which I set out in lots of a rood each for that purpose. This has succeeded to my wishes, and the result has fully answered.

The trees were planted at four feet distance each way, in

an

an irregular diagonal direction, the potatoes being planted one row only between the rows of trees,—an incalculable advantage to their growth, as the distance admits of the potatoes growing strong, and falling down on each side of the rows, forming a fit shade and shelter for the roots of the young trees. Thus situated, a quick growth ensues, and it may be reckoned that oaks, so treated, will grow a foot the first year. The smothering crop is produced the first year, and the growth of the trees established. By following up the potatoe planting for three years longer, the heads of the trees begin to unite, when all doubt respecting a fine plantation is at an end.

In the above experiments to ascertain the best method of growing oaks for timber, it is my opinion that No. 1 is the best method for sowing acorns, and No. 5 for transplanting, to obtain, in the shortest time, a fine plantation of oak timber.

Qualities of the Soil.

The surface a strong hazel loam, with a small quantity of sand, and approaching to clay from six to eighteen inches deep.

The substratum, altering to a grey, and from that to a blue clay, at the depth of four feet; below, a great depth of blue clay.

Expence per Acre.

	£.	s.	d.
Digging 2720 holes, at 4d. per score -	2	5	4
Planting by the day, or at 5d. per score, which is nearly equal in expence -	2	16	8
	£5	2	0
Deduct four years rent at 4s. per acre -	0	16	0
Total expence per acre - -	£4	6	0

The

The plantations, at former periods, at Belvoir, were of the best quality, and illustrate the principle of forming plantations designed for oak timber, with oaks only. The plantations near Belvoir Castle, two of which appear to have been planted from 130 to 140 years since, one with a variety of oaks, elm, ash, horse and Spanish chesnut, lime, alder, silver fir, Scotch ditto, holly and yew, were in a rich deep soil. It is certainly desirable to know the result of such a plantation, where such variety of useful timber has been planted. The elm and ash have compleatly obtained the ascendancy, to the great injury of the oaks, and other varieties of forest trees.

The elm and ash form one of the finest plantations in the kingdom. The trees are of large straight bolls, from thirty to sixty feet in height, and from twelve inches to two feet the girth.

The other plantation of this date is of oaks only, which are remarkably fine: they have long straight handsome bolls, from thirty to fifty feet, and from ten to sixteen inches girth. The plantation is one of the finest for oak timber in the kingdom, the wood being of the best quality. The soil and situation of both are similar.

There are two other plantations, which appear to be about one hundred years old, and which are exactly in the same predicament. Where there are oaks only, they are very fine clean timber; on the contrary, where ash and Scotch firs are mixed, the oaks are good for little, and irrecoverable.

Other plantations have been made about forty years since, among which, there is one of oaks only, containing about one hundred acres, which was many years compleating, the whole being sown with acorns. On that part which has been longest finished, the trees are very fine and straight; indeed the whole of them are in a flourishing state.

Plantations

Plantations have been made here to a great extent, within the last twenty-five years, of every description; of the particulars of these plantations I cannot correctly speak, but habitually knowing their situation, I am led to think that there cannot be less than eight hundred acres, well planted, and in a flourishing condition.

I beg leave particularly to observe to the Society, that the plantations made by her Grace within the last sixteen years, generally on land not calculated for the purposes of husbandry, are numerous, in various situations and great variety of soil, principally in the above-mentioned species of red earth, having a loose inferior iron-stone rock, to the depth of twelve feet; others are situated on hazel loam, approaching to clay, from six to eighteen inches deep, altering after that to a blue clay, at the depth of six feet. Some of the plantations are situated on strong adhesive clay, not calculated for any purpose of husbandry. Her Grace has also planted on bogs of the worst description, many of which have been so full of water, that by treading on the ground suddenly, it would shake for twenty yards together. These have been laid dry effectually, by a method of draining with black thorns, agreeably to her Grace's directions, and are now fine flourishing plantations. They are composed of varieties of forest trees, viz. oak, elm, beech, hornbeam, sycamore, lime, Spanish chesnut, horse chesnut, birch, alder, walnut, larch, silver fir, Balm of Gilead fir, Weymouth pine, Scotch and spruce fir, which varieties are mixed and planted in such soils and situations as are most suitable for their growth; and on such other soils as are best adapted for the purpose, the plantations are composed of half oaks, and filled up with other mixtures. Her Grace's various plantations, made by her particular directions, contain upwards of one hundred

and ninety acres, and bear the above variety of trees, to the amount of 768,211; all of which are in a fine healthy flourishing state.

Having gone through my observations on the plantations at Belvoir, it will be obvious to the Society, that the several plantations made by her Grace are in a very flourishing state, and are likely to become, at no very distant period, a valuable acquisition to the country.

(Signed) MATTHEW POUND, *Woodman.*
REV. SIR JOHN THOROTON.

To C. TAYLOR, M. D. SEC.

The GOLD MEDAL, *the Premium offered in Class 62, was this Session adjudged to* JOHN CHRISTIAN CURWEN, *Esq. V. P. M P. of Workington Hall, Cumberland, for Feeding of Cattle. The following Communications on the Subject were received from him.*

MY DEAR SIR,

UNDER the fostering influence of the Society of Arts, &c. great has been the advantage reaped by the empire in every useful branch of knowledge. The hope of their honours has, and I trust will to the latest period, form a powerful stimulus to exertion. I speak feelingly:—Many of my experiments would otherwise have never been undertaken. My sense of gratitude for their favours, is not, I trust, the only effect produced. The sanction of their patronage on the system of soiling has had an extensive influence in spreading the practice

practice through every part of this country. The favourable light in which it is held encouraged me to attempt extending the practice still further, and suggested the trying to rear cattle by the same means.

The objects to be gained were a more early maturity, a diminished risk in rearing, a saving in cost in feeding, and the creation of an additional quantity of manure. The farmer and public were likely to be benefited, and the experiment was successful.

The result which I have now the honour of submitting to the Society, will, I hope, prove satisfactory to them, and conclusive as to the success which has attended the experiment in every point.

Seventeen calves were reared in the course of the last year: eleven short-horned, or Durham breed; six Ayrshire. Of those turned into the yard, which is done when they are two months old, not one has been lost, nor have they been subject to any complaint. Attention was particularly paid to them at the period of changing their food from turnips to clover. The intention of the experiment being to bottom the practice on a system which might afford a prospect of profit to the farmer, all costly food was rejected. The first month the calves had but one gallon of new milk per day; for three months afterwards three gallons *. A winter dairy being what is aimed at, most of the calves are dropped from November till April. Turnips and hay were given with the milk, but neither cake or meal. From June till October the food was clover; afterwards, till the end of May, turnips; till Christmas they had some little

* The twenty-five calves of this year had 1072 gallons two quarts of new milk.

hay, *being well taken to the turnip*, straw was substituted.

In size they were little inferior to those of double their age. So good was their condition, that one of the Ayrshire heifers, of eighteen months, was butchered. The live weight was fifty-five stone, of fourteen pounds to the stone. The carcass was thirty-one stone nine pounds, and the loose fat two stone nine pounds. The animal was weighed without fasting, which was equal to a tenth of its weight. The carcass was esteemed particularly beautiful, and the meat highly approved of by the Members who saw it, (for it was killed at the meeting of the Workington Society). Not one of the numerous visitors who was not agreeably disappointed as to the result. The short-horned, or Durham breed, were in much greater condition, and would have killed six-and-forty stone at least. The gain on turnips was fully three pounds a day on each of the Durham heifers. I conceive there would be no difficulty in bringing up the heifers to sixty stone of carcass at two years old. They consumed on an average six stone of turnips a day; of hay they had about half a stone; when straw was given no account was taken. Besides the food I have just mentioned, they had a feed of steamed chaff; the benefit of which was solely from its warmth, in preventing the green food disagreeing with them, as it would otherwise have been cast into the dung-hill.

The produce of two acres, divided between turnip and clover, would be abundantly sufficient to support a beast to two years old. The comparison between animal and vegetable food would be thus:—A fallowed acre of wheat may be supposed to produce thirty Winchesters of sixty pounds weight, or 1800 pounds; sixty stone of carcass would be

840,

840, taking the loose fat at five stone; seventy pounds total at 980 pounds; so that the animal food, on this system, would be equal to one half of the vegetable, where fallow is introduced, under any other system, nearly equal to a third.

The manure created was very considerable. As this depends on the quantity of straw, it is difficult to say to what extent it might be carried. In soiling in the house, the calculation is a ton a month for each beast, and not much less might be made by this mode, though not of equal quality. In the present year I have reared five-and-twenty calves with equal success. The progress is always greater on turnip than clover. The heifers of twenty months are now taken into the house, and will, as occasion offers, be given the bull. In size and figure they are of great promise. The success of the experiment has both pleased and surprized all who have seen them: nor has the example been without its effect; some of the farmers in the neighbourhood have already adopted the practice. Gratified shall I be if this meets with the approbation of the Society, and shall be happy to render any further information that may be required, trusting this new system of soiling may be as favourably received as what I formerly submitted to them. I had then no other claim to meet than that of adopting a practice prevalent in the Netherlands. At present I am a candidate for originating a system not previously known.

I beg leave to subjoin an account of the mode of burning surface soil and clay, by the use of hot lime. This practice, which bids fair to be attended with important consequences, has long been in use in Ireland. On the bogs I observed it (in a recent tour through that country) with great satis-

faction, and lost no time in adopting it. The first attempt was the burning it in kilns with roots and blocks of wood. The cost was considerable, which led to the attempting it with hot lime; seventy Winchesters of lime, directly from the kiln, spread on a layer of sods, eight yards in length and five in breadth, between some layers of sods of a foot each, will, in twenty-four hours, ignite it. Fresh sods must then be applied, and when a quantity of ashes are once procured, a proportion of clay may be burnt with it; by this mode the fire is never so hot as to vitrify the ashes. The fructifying quality depending, probably, on the union with the atmosphere, the ashes will benefit in proportion to their power of absorption. I have Swedes, with sixty single-horse carts of ashes, little inferior to those that had one hundred of dung; common turnips, from forty carts, that are forty tons per acre, and this on strong clay, not deemed fit for turnip culture. I have twenty-one acres, with only twenty cart load, that are highly promising; these are on new ground. Sixty acres of wheat, from forty carts of ashes and sixty Winchesters of lime; this was but a light crop. The soil being a clay, and the elevation great, I am disposed to attribute the lightness of the crop to its being sown too late in the season. The clover is admirable, and such as was never seen on this farm. By this power of creating manure, a much larger proportion of dung may be given to clay ground; the benefit of which, I am disposed to believe, will most amply compensate. I hope, at some future period, to be able to bring this subject before the Society. My potatoes have been housed some days, and wheat sown. Another week of good weather will see sixty acres of turnips stacked, and wheat sown. By this practice, and more early sowing,

sowing, many of the objections to growing turnips on dry soils are obviated.

I have the honour to be,
With much respect and esteem,
Your obliged Friend,
J. C. CURWEN.

Workington Hall, Oct. 15, 1815.

To C. TAYLOR, M. D. SEC.

MY DEAR SIR,

LAST night I sent you a paper on rearing cattle by soiling. Knowing your tried friendship, I have less to fear and every thing to hope in rectifying a blunder I have committed on the comparative produce of vegetable and animal food. An acre of fallowed wheat produces 128 stone eight pounds, of thirty Winchesters of sixty pounds. I fear I have stated this as only ninety; the produce in animal food sixty-five, being one half. May I beg you to alter it, or otherwise to return it for correction. I do not know how I got wrong on this point; I am glad however to have detected it. I consider this as the most important object I have accomplished in farming, and one likely to be very speedily adopted. I preferred the honours of the Arts and Sciences to those of the Board of Agriculture. Our season here has been favourable, and the crop admirable. The prices are frightful, and if they do not mend, the farmer will be certainly ruined.

I am, Dear Sir,
Your obliged Friend,
J. C. CURWEN.

Workington Hall, Oct. 16, 1816.

To C. TAYLOR, M. D. SEC.

SIR,

In reply to the letter which you did me the honour to address to me, of the 30th ult. relative to my friend Mr. Curwen's mode of rearing stock, I have only to say, that I have now been in the habit of examining their general state and condition annually for years past, and have universally found that no cattle in the country have ever been in any thing like their order, either in point of fatness or healthfulness. It was, however, only last year that we had an opportunity of witnessing the effect of his system of winter feeding on steamed food, as practised upon *young cattle*, and though their *progress* and *condition* certainly *surpassed any thing I had ever before observed at their early age*, yet I do not know how far it might be judicious to recommend the use of it generally among practical farmers, until a more minute scrutiny had been made respecting the expence of labour, fuel and food. Should it be any satisfaction to the Society to obtain a minute detail of those particulars, I shall consider it no trouble to provide them with the most accurate information I can collect, by a personal examination into every circumstance on the spot. I think, however, that there is no one who saw Mr. Curwen's young cattle last year, (which had been entirely brought up in open sheds, never depastured,) but must have received a most favourable impression of the plan, or would withhold from him his due meed of praise.

I have the honour to be, Sir,
Your obedient Servant,

G. SCOTT ELLIOT.

Woodslee, Longtown, 8th April, 1816.

To C. Taylor, M. D. Sec.

Sir,

SIR,

I HAVE been much from home lately, otherwise your letter of the 30th ult. should not have remained so long unanswered; nor am I at present able to give you a full answer to all the particulars your very proper enquiries extend to.

I was only at Workington during the Agricultural Meeting, when my attention was so much divided, that I had not an opportunity of entering so minutely into the investigation of the method of rearing young cattle, in point of œconomy, so that it is at this moment not in my power to say to what probable extent the plan may be extended, nor whether it will, with the expences attending it, be a profitable mode for the farmer to adopt.

Mr. CURWEN's young stock (those of a year old and upwards,) were certainly superior in size and condition to any that I had before seen fed upon steamed chaff, straw, and turnips, excepting particular animals reared regardless of the cost of the food: but Mr. CURWEN grows so many turnips, and maintains so very few sheep in proportion to what has hitherto been the practice of the most successful agriculturist, that I yet doubt that his whole system does not return that remuneration that is obtained where fewer cattle are kept. In coming to this opinion, I have kept in view that nearly the whole of the land occupied by Mr. CURWEN is not adapted for sheep to eat turnips on the spot they are grown upon; but this does not preclude their being led into a by-field, and eat them with great advantage to the land and to the sheep.

I propose being at Workington early in August next, at which time I will particularly examine the detail of the process of feeding from the pail to the time they are sold to

the butcher, when I will again do myself the pleasure of addressing you.

I am Sir,

Your obedient Servant,

L. ELLIS.

Longtown, 13th April, 1816.

To C. TAYLOR, M. D. SEC.

MY DEAR SIR,

I COULD not have fixed on a more appropriate spot to have addressed you and the Society on any agricultural subject.

The stacking turnips is now carried to a great extent, and with the most compleat success. This method admits of more early sowing, and wheat succeeds. The disadvantage of turnips on strong soils is much done away. The stacks are six feet wide, and piled to a point; a spit of earth is turned upon each side, serving the double purpose of a drain and a buttress for the bottom of the stack.

The turnips are topped and tooled at five shillings an acre. Care should be taken to stack the turnips dry. They should be well thatched with straw to within two feet of the ground. Swedes keep in a perfect good state by these means till June; a great advantage, also, that they come out of the stacks unfrozen. The middle of October is about the time I start to draw the turnips. The tops of the swedes are admirable food. The common turnips are ploughed into the ground.

Burning.

If the surface soil, I should advise turning up the swarf by

by the plough with a *seem* coulter, leaving one bout always. One cross ploughing cuts it into proper pieces for lifting, and saves labour. Lime immediately from the kiln will ignite the sods in twenty-four hours. A covering of sods should first be laid; then place the lime upon them, and cover it about a foot thick, taking care they are not so close packed as to exclude the air. When the sods are fired, care must be taken not to overload the fire. In proportion as ashes are obtained, the burthen to the fire may be increased. The heaps should not be suffered to rise above six or seven feet high, as the labour is increased by the height. The ashes should be raked from the top to extend the circumference of the heap, by which its power of action is increased. When a body of ashes are obtained, a quantity of clay might be burnt on the top of the heap, mixed a little with sods to keep the fire open.

Where clay alone is to be burnt, I apprehend a small portion of coal will be requisite. The main point is not to suffer the fire to be so strong as to vitrify the ashes. It should never be suffered to burst into flame. Constant attention is required; and when the sods are very dry, it must be attended to both day and night. The fresh turning the sods then can seldom be the case.

The quantity of ashes that should be given to an acre for turnips is not clearly ascertained from ten to twenty ton, according to the facility with which they can be procured. I have very good turnips with eight tons; swedes with twenty.

It is an object to burn the ashes in various parts of the field, to reduce the cartage as much as possible, not only in collecting materials, but in carrying out the ashes. A Winchester of lime would ignite about a square yard of sods a foot thick.

If

If any farther information be required, I shall be most happy to afford it.

I see great improvements in the last few years here. The mode of making permanent pasture by taking the swarf out in small pieces, and placed on the ground; one acre of old pasture will do ten acres. It is well rolled, and sown with seeds; in the second year it forms a pasture, much superior to what can be got from seeds.

Truly your obliged Friend,
J. C. CURWEN.

Holkham, 18th April, 1816.

To C. TAYLOR, M. D. SEC.

I send you GLOVER's letter, which will shew you the astonishing increase of my young cattle. *Lilly* is only fifteen months old.

April.	*Calves.*	*For Cream.*	*Sold.*	*Quarts.*	*Hall.*	*Dairy.*	*Daily*	*Quantity.*
	G.		G.	2	G.	G.	G.	Quarts.
7	27	1	54	2	2	4	88	2
8	30	1	43	2	2	11	87	2
9	27	1	46	1	2	8	84	1
10	27	1	47		2	7	84	
11	27	1	48	2	2	7	85	2
12	27	1	48	3	2	6	84	
13	32*	1	43		2	8	86	3
	197	7	332		14	51	601	

HONOURED SIR,

I RECEIVED your letter to my great satisfaction. The stock are all in good health; I weighed the four following yesterday:—the fat cow weighed 130 stone; the Ayrshire ox eighty-five stone; Lilly weighed eighty-one stone; and the

* There were five gallons of milk returned this morning, which will be given to the calves at night.

young

young ox, dropped March 15, 1815, weighed sixty-nine stone. Lilly took the bull on the 5th instant, and the red heifer on the 10th. You will be able to judge of the condition of the remainder of your young cattle, as they are doing equally well. The potatoes will scarcely hold out without reducing the quantity which is consumed. They steam ninety stone per day. I suppose there are about 160 cart-loads; they began planting yesterday. I am taking all the care I can of our turnips, as the spring is so very cold, and grass like to be backward. I answered Dr. Taylor's letter on the 2nd of this month, and I shall be glad to hear that your honour has got the Medal.

You say you left me to settle the milk delivered to the dairy. I told them they were to have it by the gallon, but they thought it was not possible to sell the skim-milk. I wished them to make cheese of the skim-milk, when there was any quantity worth making. Selling the skim-milk, would stop the sale of the other, and I think would not be so profitable. Any milk which is returned I give to the calves; and I hope to have many as good calves as Lilly the next year.

Honoured Sir, I am,

Your obedient humble Servant,

WM. GLOVER.

The skim-milk has been given to the pigs, as it was kept too long to give to the calves.

Workington Hall, April 13th, 1816.

To J. C. CURWEN, Esq. *Ibbetson's Hotel, &c. &c. &c.*

DEAR SIR,

I WAS induced, at the request of many of my agricultural friends, to weigh some of my young cattle. Inclosed I send you

you the Certificate of their weight. I have no doubt the yearling heifer would weigh 40 stone, and pay me, even now, eighteen guineas; and this without any expensive food. I shall have great pleasure in sending a surloin of the Ayrshire ox for your anniversary dinner, and though but twenty months old, I will venture to say better beef cannot be eat. I inclose a Certificate for the Committee. I may be too sanguine, but I do consider the experiment as the most important I have ever made. By showing a method by which the animal food of the empire may be augmented—one third at no expence, as at two years old I can bring the animal to the same weight it reaches at three, by grazing. I have numerous visitors, and I believe no one goes away doubting the success of the plan. At my next meeting, I shall have breeders of stock from all parts of the kingdom, and, if they do not unanimously confirm my statement, I shall feel myself bound to return the Medal, should I be so fortunate as to obtain one from the Society.

I last year showed my yearlings *againt* two-year-olds, and obtained the Society's premium. I wish the Society would depute some Member to attend, and view the stock. If his report shall not confirm every particular that I state, I pledge my honour to repay all the expence of the journey, as I wish this practice to be introduced under the auspices of the Institution. I will, with pleasure, pay one half of the expences of the Member deputed, though I could wish to hold the Medal, if voted me, till he is compleatly satisfied of its being deserved; and, in case I am not entitled to it, I will pay the whole expence, and forego the honour I am so ambitious of. The obligations I owe the Society, would make it highly gratifying to me that they should introduce to the public,

public a practice that may one day or other be of such essential service in augmenting the victual of the empire.

With great respect,
Your obedient humble Servant,
J. C. CURWEN.

I intreat you to press the deputing a Member to view the stock, who will also report as to green crops and soiling stock, so little known in the South. Whatever you undertake on my part I will perform.

CERTIFICATE.

WE hereby certify, that a short horned heifer calved at the Schoose Farm on the 7th of January, 1815, was weighed this 20th of January, and proved sixty-eight stone of fourteen pounds, which leaves no doubt, without any forcing food it would reach an hundred stone at two years old: that its food, has been clover, turnips, and straw, with steamed chaff; and scarce any hay. A steer, dropped the 18th of March, 1815, weighed fifty-four stone. The whole of the stock reared this year, thirty-three in number, have been perfectly free from disorder. An Ayrshire steer calved the 21st of July, 1814, weighed the 20th of January, was seventy-four stone, and is quite fit for the butcher.

GEORGE AITKIN,
WM. GLOVER.

January 20th, 1816.

HONOURED SIR,

WE hereby confirm the Certificate sent by us to the Society of Arts, dated the 20th of January, 1816, to be correct,

rect, and, that the statement of the several articles mentioned is accurate.

Witness our hands, this 2nd day of April, 1816,

GEORGE AITKIN,
WM. GLOVER.

To C. TAYLOR, M. D. SEC.

*** AT the anniversary dinner of the Society, held at the Free Masons' Tavern, on Monday, May 27, 1816, a surloin of beef, of the Ayrshire breed, fed according to Mr. CURWEN's plan, was tasted by many of the Members present, who highly approved the flavour of the meat, as well as the beautiful appearance of the joint. The following particulars of Mr. CURWEN's experiment were circulated in the room.

MR. CURWEN's *Expcriment.*

The best breeds of Cattle are slaughtered at three years old, requiring the produce of four acres, being two years depastured, weight from 60 to 70 stone of 14lbs.

Stock reared on the soiling system may be brought to an equal weight at two years old on the produce of two acres.

Cost of Feeding on this Plan.

	£.	s.	d.
210 Gallons of new milk.—The first month one gallon per day, three months two, at 6d. per gallon, - - - - -	5	5	0
An acre of turnips, calculated at 20 tons,	5	5	0
An acre of clover, producing 20 tons, at 2 cuttings, - - - - - - -	10	0	0
	£20	10	0

Value

Brought forward	£20	10	0
Value of calf when dropt, - - -	2	0	0
	£22	10	0
Carcass 66 stone, at 8s. 6d. sinking offal,	28	1	0
Probable profit	£5	11	0

Food Consumed.

120 Days, when at milk, suppose one stone of green food per day, - - - - - - -	120 stone
606 Days, at eight stone, - -	4,848
	4,968
Forty tons of green food, - - -	6,400
Surplus, - -	1,432 st.

On a supposition that the calf weighed six stone when dropt, the gain would be 18 ounces per day.—This gives 80 ounces of green food for the production of one animal.

The health of the animals reared in houses by soiling, is superior to those depastured, and the loss infinitely less.—The progress of the animal being never checked, the symetry will, it is believed, be more perfect.

Schoose Farm, May 21, 1816:

This is to certify, that an Ayrshire ox, fed by J. C. CURWEN, twenty-two months old this day, was slaughtered on the 19th inst., live weight from food, on the 17th, at twelve o'clock at noon, 88 stone, of 14lbs.

On the 19th, having been kept fasting, 83 stone.

1 Fore

	st.	lb.		
1 Fore quarter, -	12	8	25	5
2 Ditto, - -	12	11		
1 Hind do. - -	12	1	24	5
2 Ditto, - -	12	3		
			49	10 carcass.
Loose fat, - -	6	6	16 lbs. to the stone.	
Hyde, - -	5	7		
Back - - -	9	2		
Blood, - - -	2	9	32 stone.	
Head, feet, legs, -	8	1		
Kidnies, - -	0	3		
Loss when cut up, - - -			1	4
			33	4

Witness, WM. HOOBLOS, Land Agent.
GEORGE AITKIN, Butcher.
WM. GLOVER, Feeder of Stock.

N. B. The Ayrshire are very inferior in early maturity and propensity to fatten, generally speaking, to other breeds.

THE GOLD MEDAL, *the premium offered in Class* 1, *was this Session adjudged to* WILLIAM CONGREVE, *Esq. of Aldermaston House, Berks, for planting* 447 *acres with acorns. The following Communications were received from him.*

SIR,

I BEG leave to transmit a certificate of my having planted four hundred and forty-seven acres of land with acorns, between

between February 1813, and April 1815, and I shall be very happy if the Society of Arts should think these plantations entitled to the premium offered in article I.

The whole of the land lies in this parish, and, with a very trifling exception, is a new inclosed waste, chiefly covered with furze and heath, and is part of the same extensive tract of common on the southern border of this county, in which I made some plantations of larch in the years 1808, 1809, and 1810. For these plantations, the Society did me the honour of presenting me with the Gold Medal, and they were then in a very flourishing state; shortly afterwards, however, I discovered, that though the surface was in general covered with gravel and flints, the substratum was every where clay, and that, in many places, the larch plants were evidently suffering from too great a degree of moisture in the soil.—For this reason, and from having observed that there were large oak trees growing in hedge rows on all sides of the common, where the land appeared to be of no better quality, I determined to plant the remainder with acorns instead of larch; and, I am happy to say, that I have every reason to be satisfied with the plan I have adopted. The acorns were planted by women and children with sticks used in bean setting, one inch deep, and in rows at different distances; but the distance I prefer for the rows is eight feet; the acorns in the rows are from six to twelve inches apart.

The whole of this land is also planted with Scotch firs, four feet square, which flourish extremely well, and which may be cut down when they become so large as to injure the oaks. I have always found in older plantations that the Scotch firs are excellent nurses to the oaks, and at twenty-five or thirty years growth (probably about the time they will begin to injure the oaks), the firs will be of very consi-

derable value, as is clearly proved by Mr. Waistell's very ingenious papers in the twenty-sixth volume of the Society's Transactions. Oak timber of an early age is of very small value; it would therefore be a long time to wait for any return, if there was no fall before the oak came to perfection.

Besides the quantity of land above-mentioned, I have commenced planting with acorns the land formerly planted with larch, which consisted of one hundred and ninety acres, making in the whole six hundred and thirty-seven acres. I was at one time fearful that most of the larch would have died, but they have lately very much recovered, and many of them are now in a healthy state. I have great satisfaction in being able to say, that the plantations of acorns, for which I received the Society's Gold Medal in 1809, are in a thriving state, and have in some places exceeded my most sanguine expectations. I have lately measured some of the oaks, which are twenty feet high.

I have the honour to be, Sir,

Your most obedient servant,

WILLIAM CONGREVE.

Aldermaston House, Berks, Nov. 5, 1815.

To C. Taylor, M. D. Sec.

Certificate.

We hereby certify, that we have examined the land described in the annexed statement; that the whole was planted with acorns between February, 1813, and the end of April, 1815; that it is not fit for the purposes of husbandry; that

that it is well fenced, the plants in a thriving condition, and that there are more than *one thousand plants* upon an acre.

J. KNIPE, Minister of Aldermaston.
WM. STEPHENS, } of Aldermaston.
WM. HICKMAN, }

SIR,

IN answer to your letter of the 9th, I beg leave to inform you, that the expence of planting was so very trifling, that I did not keep any account of it; but I think that the whole expence, including the collecting of the acorns, could not have exceeded five shillings an acre.

I am, Sir,
Your most obedt. humble servant,
WILLIAM CONGREVE.

Aldermaston House, March 12, 1816.

TO C. TAYLOR, M. D. SEC.

The GOLD MEDAL, *the Premium offered in Class* 14, *was this Session adjudged to* MICHAEL MEEK, *Esq. of Sober, near North Allerton, for planting* 134 *Acres, with* 588,763 *Forest Trees. The following Communications were received from him on the Subject.*

SIR,

UNDERSTANDING the Society of Arts, &c. give premiums for the encouragement of planting, I take the liberty of putting into your hands an account of a plantation I made

in the spring 1813, upon a lot of ground which I purchased for that purpose at Great Broughton, near Stokesley, in the county of York, containing 134 acres, 3 roods, 30 perches, (see Certificate No. 1) on which I planted 588,763 trees, of various kinds, as stated by Certificate No. 2. The situation of the ground, owing to its declivity, is quite unfit for agricultural purposes; it has a north aspect; the soil is better and deeper, for the most part, than is generally met with where so much declivity is, and in nature seems well adapted to the growth of fern, excepting the lower parts of the bank, where many springs had made their appearance, but which I caused to be made dry by the assistance of open drains. The subsoil here is yellow clay, the rest is upon a porous rock, which in a few places makes its appearance upon the surface. My engagements in life made it my interest to get this plantation out of hand as speedily as possible; to effect which, I proceeded as follows:—The shape of the ground is that of an oblong, which I caused to be divided by stakes into eight divisions; having previously made it known in the country, amongst the labouring class, that a great number of workmen were wanted, to perform various kinds of work, such as draining, holeing and planting, &c., I presently had a sufficient number, so as to commence operations. As they came I divided them into companies, and to each gave a division to hole; which, after draining the wet parts by day, I let, giving ninepence per hundred for such as were for oaks, to be at nine feet distance every way, and sixpence per hundred for the rest, which, with the larger holes for the oaks, were to be at three feet distance from centre to centre, intending to plant 4840 trees upon an acre. It was not long before I had 116 men at work. During the time the holeing was going forward, I had many opportunities

ties of selecting a man from each company of a more upright disposition than the rest, by the manner of executing his agreement, that when I came to the planting part which was done by day, the command of the company he belonged to was given to him, with the addition of some women or boys, to carry plants; the providing of which, and the inspection of the whole, was left to my gardener and myself. The process of planting did not last longer than sixteen days.

The border of the plantation on all sides is full of green firs, a lesser proportion is scattered all over. The whole at this time, I am happy to say, promises to equal my wishes, and exceed my most sanguine expectations. In some parts of the country, I have heard complaints of plantations in remote places being visited by nightly depredators for poles, broom, shafts, &c. To guard against an evil of this kind, I purchased another lot of ground, on which I built a cottage, and in this I settled my woodman; he was one selected from the 116, who seemed to have my interest most at heart. My object in going so much into detail, is to shew some how easy it is to execute a work of this kind with perfection and dispatch; and to others, who have planted ten times more than myself, that whatever is worth doing, is always worth doing well.

To the above I cannot add it was performed at a small expence, nor can I omit saying, should the Society for the Encouragement of Arts, &c., (for whose inspection this is intended, with the certificates herewith), require any further information upon this subject, it will give me pleasure to forward it; and should I be so fortunate as to become a successful candidate for the premium offered for Article 14, it will give me the greatest secondary satisfaction; while my first is, that of always remembering I have caused to be

planted, at different times, upwards of one hundred and forty acres of land, for the purpose of growing English oak.

I have the honour to remain, Sir,

Your most obedient servant,

MICHAEL MEEK.

Late of Sober, now at Knaresborough.

Sober, near North Allerton, 1st Jan. 1816.

To C. TAYLOR, M. D. SEC.

CERTIFICATES.

No. I.

THIS is to certify, that Michael Meek, of Sober, near North Allerton, in the county of York, did purchase of the sole Commissioner for the Inclosure of Great Broughton Common, on the twenty-first day of December, 1812, a certain part of the said common, called Broughton Bank, which is very steep and wholly unadapted for the plough, containing by admeasurement 134 acres, 3 roods, 30 perches; all of which he planted before the first day of April then next ensuing, as I have been informed and believe, the same being first well fenced with good stone walls and quick-set hedges; and I believe that the whole is now in a healthy and thriving condition. Witness my hand, the 29th day of December, 1815,

WM. POWELL, Solicitor to the said Inclosure.

No. II.

THIS is to certify, that Michael Meek, of Sober, near North Allerton, in the county of York, did plant in an inclosure, called Broughton Bank (containing by admeasurement 134 acres, 3 roods, 30 perches), 588,763 trees, of the different kinds named below, between the 1st day of January, 1813,

1813, and the 1st day of April, 1813, which inclosure was well fenced with good stone walls and quick-set fences, and that the trees are now in a healthy and thriving condition; and also, that the said Michael Meek hath built a dwelling-house for his woodman to reside in adjoining the plantation, for the purpose of preventing any depredations that may be intended thereupon.

Larches - - -	401,430	Brought up	576,825
Oaks - - -	70,835	Spruce firs - -	1,580
Ashes - - -	40,980	Huntingdonshire	
Sycamores - -	20,800	Willows - -	7,800
Scotch firs - -	30,300	Birches - - -	1,400
Beeches - - -	7,180	Elms (Dutch) -	1,000
Alders - - -	5,300	Silver firs - -	158
	576,825	Total	588,763

JOHN NICHOLSON, Woodman.
JOHN ANDERSON, Nurseryman to the said Michael Meek.

I HEREBY certify, that I have examined the above-named John Nicholson and John Anderson, and that they have before me testified to the above statement being correct.

GEORGE MARKHAM,
One of his Majesty's Justices of the Peace for the North Riding of the county of York.

SIR,

IN compliance with your request, this is to certify, that I signed the Certificate, No. 2, in the presence of Mr. Markham, of Stokesley, on the 29th of last December; also that Mr. Meek's statement to you, a copy of which I have seen,

is accurate in all its particulars, and also that John Nicholson signed his name at the same time, in my presence, before Mr. Markham.

I am, Sir,

Your humble servant,

JOHN ANDERSON, Nurseryman.

Clender, by Steeple, near North Allerton, March 16, 1816.

To C. TAYLOR, M. D. SEC.

SIR,

ON the receipt of your first letter, I sent one enclosure to John Anderson, and the other to Mr. William Powell.—Mr. Powell was at York assizes at the time; still I expected, ere this, that he would have replied, and enclosed John Anderson's answer with his own. As there seems a little error in your note to Mr. Powell, of his having certified to the number of trees in the Certificate No. 1, I have recommended him to go into the plantation, and measure exactly the distance from tree to tree, and then to forward you his answer in that manner, from which you will easily find the number upon an acre, and with Mr. Powell's certificate to the number of acres, you will be able to make them agree, I dare say, with the number as stated by John Nicholson and John Anderson, in Certificate No. 2. With regard to the exact number, I had no one employed who had any interest in knowing it, except John Anderson, John Nicholson, and myself. If you wish for more evidence of the distance from tree to tree, I can supply you with plenty, and for more evidence to the number of acres, I refer you to Mr Humphries, of Rippon, Yorkshire, who was sole Commissioner

sioner for the inclosure, and of whom I purchased the land. The address of Mr. Powell is at Stokesley, Yorkshire; as also that of Mr. Markham, the magistrate, before whom John Nicholson and John Anderson testified to the number of trees. In a few days, you may fully expect answers from both Mr. Powell and John Anderson; at the same time, if any thing more is wanted, it will give me pleasure to procure it.

As soon as the society have come to a determination upon the premium, so far as concerns my prospect, and should I be so fortunate as to be the successful candidate, it will particularly oblige me by being informed: and also if my presence will be required in town, and about what time.

I am, Sir,

Your most obedt. humble servant,

MICHAEL MEEK.

Knaresbro', 23d March, 1816.

P. S. The plantation in question is about three miles from Stokesley, and possibly you may have some correspondents in that neighbourhood, who can, if asked, say something about it.

To C. Taylor, M. D. Sec.

Sir,

On my return from the assizes, I find your letter of the 7th instant, which has been forwarded to me by Mr. Michael Meek. On referring to a copy of the certificate, signed by me, under date 29th of December last, I find that same applies only to Mr. Meek, having planted the extent of ground therein mentioned, namely, 134 acres, 3 roods, 30 perches, and not as to the number of trees planted, which fact I was not sufficiently conversant of to certify for. I beg leave, however,

however, to mention, that from my own observation in part, (having a plantation of sixteen acres immediately adjoining,) and from the report of a confidential clerk, whom I have sent expressly for the purpose, that the plants are upon an average not more than three feet asunder; and from this you may be able to estimate the number of plants.

I have the honour to be, Sir,

Your most obedient servant,

WILLIAM POWELL.

Hoberley, 26th March, 1816.

To C. TAYLOR, M. D. SEC.

The SILVER MEDAL, *the Premium offered in Class* 14, *was this Session adjudged to* BACHE THORNHILL, *Esq. of Stanton, near Bakewell, Derbyshire, for planting* 116 *Acres with* 315,000 *Forest Trees, being the second greatest quantity. The following Communications were received from him on the subject.*

SIR,

I BEG to be permitted to claim the Gold Medal (Class 14) offered this year by the Society for the Encouragement of Arts, &c. for having inclosed and planted 116 acres of waste land with 315,000 forest trees, between the 1st of October, 1812, and the 1st of April, 1813.

These plantations are situate about four miles north of Bakewell, on parts of the lately inclosed Common of Stanton, which were found to be unfit (either on account of the barrenness

ness of the soil, or the quantity of stones or rocks, with which the surface is covered) for agricultural improvement.

About fifty acres adjoin the newly-made turnpike road between Haddon and Winster, where the soil being tolerably good, and the situation sheltered, oaks and Spanish chesnuts sufficient to make a wood of themselves have been planted, and larches, spruce firs, and birches, mixed with them as nurses. This land being covered with very strong fern, plants of a large size (from three to four feet high) were used, in the hope that they would be able to struggle successfully with this opponent, but it has been found necessary to cut the fern each summer, and a man, with boys under his care, have been employed for this purpose, at an expence of about three shillings per acre. The holes for the plants were made twenty-two inches wide, and about four feet asunder, where the rocks and large stones permitted this distance to be kept. This operation was performed with the mattock, by bargain, in the latter end of the preceding summer, when the poor in the neighbourhood were not full of employment, at an expence of about thirty shillings per acre, and the trees were planted in the winter following, by day labourers, under the direction of the person who had the management of my nurseries.

The other plantation, made the same year, is on a more elevated part of the same common, and, besides being very much exposed to winds and colds, the soil is of a particularly unfavourable nature; being of that sort which produces in its natural state nothing but the shortest ling. On this part I planted larches, mixed with Scotch firs, both sorts very small. The distance between the plants here was only three feet and a half, in order that they might better shelter one another, and the holes were (proportionably to the smaller plants),

plants), smaller than those before mentioned, so that the expence of planting, exclusive of the cost of the plants, was in each situation much the same.

I have the satisfaction to find that these plants have, in defiance of the natural obstacles which the situation presented to my fears, taken firm root, and are in a healthy, growing state, much better than I had expected; whilst on the ground first mentioned, the trees have made a progress equal to any I ever observed in the same short time, where the great expence of trenching had not been incurred.

As an old planter, I may be allowed to take this opportunity to state the great advantage I have always found in keeping my plants one or two years at least in a nursery of my own, instead of using them immediately from a sale nursery. Whenever I have been obliged to use bought plants, without so keeping them, they have generally died. I would also use the same privilege to recommend those who propagate the Spanish chesnut, (which I consider to produce timber at least equally valuable as oak,) to prune these young trees five or six years after they have been planted, as they are very liable to throw out strong shoots from the bottom of the stem near the root, which, if left undisturbed for several years, rob the principal trunk of the chief part of its nourishment, and if at length cut off, are reproduced in greater numbers, in consequence of the inactive vessels having grown too contracted to convey so greatly-increased a quantity of sap to the head.

I have the honour to be, Sir,

Your very obedient humble servant,

BACHE THORNHILL.

Stanton, Bakewell, Derbyshire, 20th December, 1815.

To C. Taylor, M. D. Sec

We

We do hereby certify, that the plantations referred to in the foregoing statement, are well fenced and secured, and appear generally to be in a healthy growing state.

P. Gell, Hopton, near Wirksworth, Derbyshire.
Wm. Brittlebank, Winster, near Wirksworth, Derbyshire.
D'Ewes Coke, Brookhill, near Alfreton, Derbysh.

Sir,

I beg to acknowledge the receipt of your letter of the 7th instant, and to state, that I did subscribe my name to a certificate on behalf of Mr. Thornhill, certifying that he had planted 116 acres of waste land with 315,000 forest trees, between the 1st of October, 1812, and the 1st of April, 1813; and that from personal observation, and a knowledge of the lands planted, I do believe Mr. Thornhill's statement to be correct.

I am, Sir,
Your very obedient servant,
Wm. Brittlebank.

Winster, 9th March, 1816.

To C. Taylor, M. D. Sec.

Sir,

I certainly put my signature to a certificate respecting Mr. Thornhill's plantations; and from actual inspection I can state the whole to be perfectly true.

I am, Sir,
Your most obedient servant,
Philip Gell.

House of Commons, 14th March, 1816.

The

The GOLD MEDAL, *the Premium offered in Class* 58, *was this Session adjudged to* J. G. HALL, *Esq. of Mixbury, near Buckingham, for protecting* 1,160 *Merino Sheep. The following Communications on the Subject were received from him.*

SIR,

INCLOSED, herewith, I send you a true account of the management of my sheep, &c. verified by a certificate annexed from Mr. PAINTER, a respectable farmer living in this parish. You will oblige me by laying it before the Society of Arts; and should my attendance be required, a notice will oblige me.

I shall be in town on Friday week, and will do myself the pleasure of calling, should I not hear from you sooner.

Your's truly,

J. G. HALL.

Mixbury, near Buckingham, Feb. 20, 1816.

SIR,

IN transmitting the following statement for the consideration of the Society of Arts, &c. I am actuated by two motives; first, the hope of obtaining the honorary medal, which, should I succeed, will be a tenfold recompence for the trouble I may have in drawing this up; secondly, the satisfaction I shall feel by making known to the public the most advantageous mode of managing sheep, in hopes of rendering a benefit to some farmers and agriculturists, by inducing them to adopt similar management. My farm consists

consists of 568 acres, and the number of sheep (all pure Merino) which the farm supports, and have been protected in yards during the winter months, are 1160, viz. ewes 400, and wethers 760. My ewes are divided into flocks, the one protected in a yard sheltered by barns, outbuildings, &c. are fed upon good hay, have always plenty of water, and, as they lamb, I allow them a small portion of brans, a cheap sort of food, very nourishing, and particularly good for the milk. For the other ewe flock, being younger sheep, I erected a temporary yard of furze and straw, in a sheltered corner of the turnip-field, which they are feeding off in the customary way; but so contrived that the sheep may at their pleasure return to the yard, which they do invariably towards evening. I then usually give them a small quantity of hay, where they continue till morning. The two flocks I have been describing amount together to 400, most of which have lambed. The number of lambs lost by severity of the weather, and accidents liable to occur to all animals in a state of pregnancy, are twenty-one; the number of ewes lost since I first adopted the custom of yarding my sheep, amount to eight, which losses must be considered small out of so large a ewe flock. I endeavour as near as possible that my lambs shall come in the month of November, which time I prefer greatly to the spring of the year, for this reason:—In November we have always a great plenty of food (turnips and hay) for our ewes, to enable them to nourish and support their lambs, when on the other hand, in March or April, and indeed sometimes May, it not unfrequently occurs that our turnips and hay are expended before the young grasses are sufficiently forward to allow of sheep depasturing on them; a very great inconvenience, and sometimes of serious consequence to persons having

having a number of ewes dropping their lambs at that season, which we are not liable to at the fall of the year; for it is pretty generally allowed, that ewes with lambs by their sides require more food than at any other period.

The wether sheep are also divided into two flocks, both of which are protected in yards; one a farm-yard, formed by sheds, &c., the other with straw and furze; both of these flocks are fed on barley-straw, and hay only once a day, on which, I am firmly of opinion, no other sheep but the Merino would have continued in as good store order as the whole of my flocks are at this time. Since I first yarded the wethers, the number I have lost is eleven, out of the 760, which loss, I may, I think, again add, will be trifling, it being the general calculation, that large flock-masters loose about one sheep in a score during the winter months, at which rate to estimate my loss out of 1160 sheep, would amount to fifty-eight instead of nineteen, as really is the case. I have next to inform the Society, that owing entirely to yarding my sheep in the manner described (keeping them always well littered, which is of the first importance), I am enabled to manure *eighty acres more land* in the present year, than ever was before done, in one year, on the farm, at the rate of ten good loads to each acre; to this part of my statement, I should wish particularly to draw the attention of the Society, to shew what a surprising advantage arises to the farmer by protecting sheep in yards; for it enables him to make, not only so great an extra quantity of manure, but also that description of manure (sheep dung) the best calculated to improve his land.

Another point to which I again solicit the attention of the Society, is œconomy in sheep-racks, a valuable consideration

tion where a number of sheep are kept. Five hundred of my present flocks feed out of racks made by myself and shepherd, from the common twig-hurdles, by hammering a portion of the twigs which form the hurdle upwards, but the greater part of them down, leaving a space for the head of the animal to go through; they are placed about two feet from the wall, which forms the yard thus:

They hold hay, and answer every purpose equally as well as the more expensive ones. Another very cheap and useful rack I am in the habit of using, of this kind,

made by a common hedger with the same materials, and according to the same principles that he would work a smooth hedge; they can be made to hold any number of sheep; those for twenty-four sheep, wood and all included, cost two shillings; and are, I am confident, if well made, equally as durable as any other description of sheep-rack; I wish these œconomical contrivances were generally known to farmers, to whom cheapness, even in the construction of a sheep-rack, is always of importance; but more particularly so in the present alarming and distressing times.

Should the Society consider this account as worthy the premium, No. 58, for which it is presented, it will give

a fresh stimulus to my exertions for the discovery of new and more beneficial improvements in agriculture.

I am, Sir,

Respectfully your's,

J. G. HALL.

Mixbury, near Buckingham, 16th Feb. 1816.

To C. TAYLOR, M. D. SEC.

I, HENRY PAINTER, of Mixbury Lodge, in the county of Oxon, do certify, that this a true account, drawn up by James G. HALL, of Mixbury aforesaid; also that his flocks are in good order, and have been protected in yards, in the way he has described, ever since the commencement of last November.

As witness my hand, this 19th day of February, 1816,

HENRY PAINTER.

DEAR SIR,

IN reply to your queries this morning received, I beg to inform you, first, my course of crops are—*Turnips; Barley*, with grass seeds—*the grass seeds lay* two years; *Wheat; Tares*, sown as soon as possible after the wheat is harvested, and fed off with sheep in the spring.

Rye, sown the following autumn, and fed off with sheep in the spring, in time to admit of the land being again sown with turnips.

Secondly, my farm consists of 450 acres arable, one hundred acres of which is sown every spring with grass seeds to remain two years, and about the same quantity of old artificial

tificial grasses is ploughed up in the autumn for wheat. I have also twenty acres of meadow; forty-three acres of pasture; and about fifty acres of saintfoin, which will remain six or seven years.

Thirdly, the soil chalky, upon a poor sort of lime-stone, capable on the average of producing two quarters of wheat per acre, and four quarters of barley.

Fourthly, the quantity of bran used this winter, forty sacks, (six bushels to a sack) at 3s. 6d. per sack, value £7.

Fifthly, I have practised my present custom of protecting sheep since last October, and shall continue it this year till the first of May. Owing to the advantages I have derived this winter from the practice of protecting sheep, I intend to adopt it always in the winter months.

If I possibly can, I will wait on the Committee on Monday evening, but I fear I shall not be able to come to town so soon, but will certainly call on you in the course of next week.

I am, Dear Sir,

Your's truly,

JAMES G. HALL.

Mixbury, March 28, 1816.

To C. Taylor, M. D. Sec.

DEAR SIR,

I am extremely sorry that it is not in my power to attend the Committee, as you mention, on Monday next; but, owing to indisposition, I have not been able to leave the house for these last few days, which would prevent my ac-

 ceding

ceding to your request; besides, when I shall, it will be particularly inconvenient to leave home this month, as it is seed-time, and I have no one to assist me in the management of my large farm. I trust the Society, on these grounds, will excuse my personal attendance, and will be able to decide on the merits of my Papers. Inclosed I send you Mr. Henry Painter's reply, and also Mr. Stephen Painter's Certificate, corroborating my statement. Both these gentlemen are large farmers in this parish, the one occupying between four and five hundred acres; the other about three hundred acres.

If it is not being too troublesome, I shall be greatly obliged by a note, informing me the determination of the Committee relative to my business.

I am, Dear Sir,
Your's truly,

JAMES HALL.

Mixbury, Friday 12th April, 1816.

To C. TAYLOR, M. D. SEC.

SIR,

IN consequence of your letter, received this morning, I have to inform you that the certificate you received, confirming Mr. Hall's statement, was signed by me, and I have no doubt as to the correctness of it:—I beg also to add, that I consider his plan for protecting sheep as advantageous in every respect, and particularly as it tends so greatly to increase the quantity of manure.

I am, Sir,
Your obedient Servant,

HENRY PAINTER.

Mixbury, 10th of April, 1816.

To C. TAYLOR, M. D. SEC.

I

I STEPHEN PAINTER, of Mixbury, do certify, that the account of James G. Hall, sent to the Society of Arts, &c. which I have examined, is correct, according to the plan he has adopted for protecting sheep.

STEPHEN PAINTER.

SIR,

IN reply to your queries respecting my sheep, I have to inform you, that the number I stated in my address to the Society of Arts, &c. were protected from last October to *this present week*; but from this time till next winter, they will not be housed. My flocks were maintained on turnips and hay, the produce of my farm during the winter, and some brans, as I informed you, were purchased. Last summer they were maintained on the grasses of the farm and other green crops, such as tares, &c., which were considerable. This, I assure you, is true. I have purchased no food of any kind during the year, except the brans mentioned; and, since I last wrote to you, four loads of hay. The farm is 563 statute acres. I hope the Committee will not doubt my statement being correct, as I have, I believe, conformed in every respect to the rules and requests of the Society. I must inform you that I find the extra quantity of manure made will be something considerably more than I stated.

I am, Sir,

Your's truly,

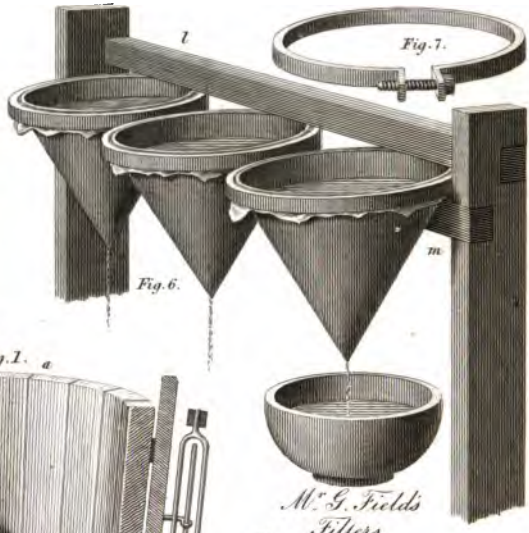
J. G. HALL.

Mixbury, 24th April, 1816.

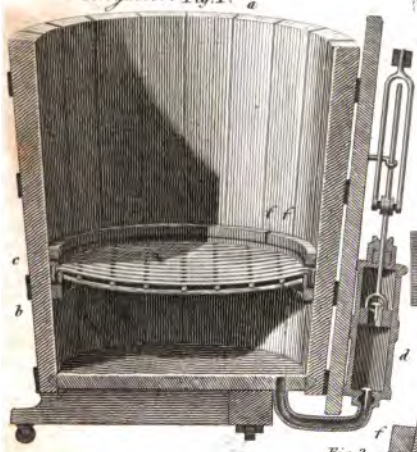
To C. TAYLOR, M. D. SEC.

Mr. Geo. Field's Physeter or Percolator.

Fig. 8.



Mr. G. Field's Physeter.



Mr. G. Field's Filters.

Fig. 9.

Fig. 3.

Fig. 5.

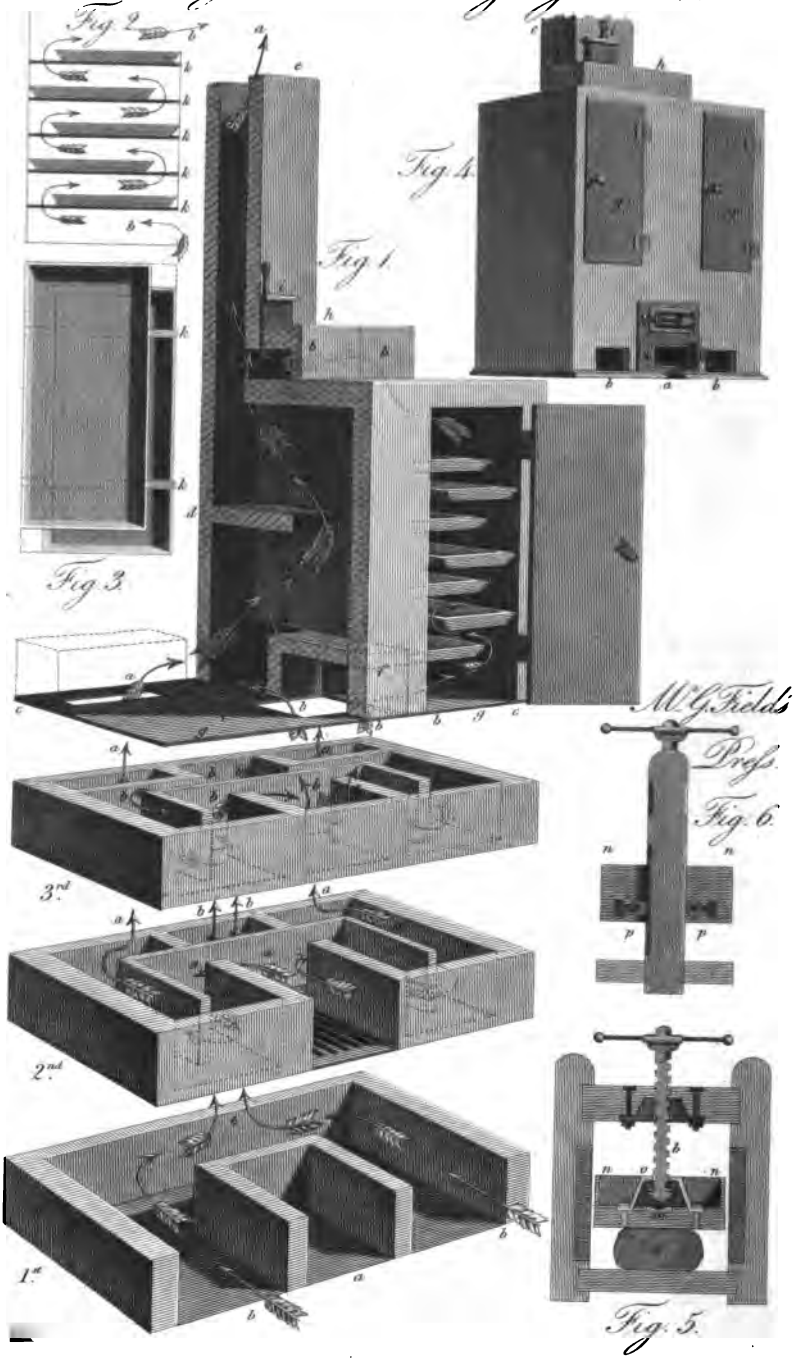
Fig. 4.

Fig. 10.

Varley.

Engraved by James Davis.

Mr. Geo.e Field's Drying Stove.



Cornelius Varley.

Engraved by James Davis.

PAPERS

IN

CHEMISTRY.

The GOLD ISIS MEDAL *was this Session voted to Mr.* GEORGE FIELD, *of Heath Cottage, Hounslow, for his Apparatus for preparing Coloured Lakes. The following Communications were received from him, and several Specimens of the Lake are preserved in the Society's Repository.*

SIR,

I HAVE the honour to lay before the Society of Arts. &c. the plan of a very simple and efficacious machine, called a *Physeter*, or *Percolator*, for filtrating liquids with great expedition. Its powers are too evident upon the face of the enclosed plan and description, to require certifying; and the machine itself may be *seen in use.

I have the honour to be, Sir,
Your obedient humble Servant,

G. FIELD.

Heath Cottage, Reading Road, Hounslow,
Nov. 1, 1814.

To C. TAYLOR, M. D. SEC.

* The Committee of *Chemistry* went to Mr. Field's, Heath Cottage, Hounslow, and inspected the Machine, while in use.

Sir,

In compliance with the desire of those gentlemen of the Society of Arts, &c. who did me the honour to inspect my apparatus, that I should extend my late communication, I beg to submit to the Society, first, the following more particular description of my *Physeter*, or *Percolator*.

Fig. 1, is a vertical section of the machine.—*a* A strong tub.—*b* A hoop fixed therein.—*c* A sieve of copper wire, inverted horizontally on the hoop *b*.—*d* A small lifting pump. The strainer *c* is covered in the first place with woollen baize, and secondly with silken cloth of the kind called lutestring, thin edges being passed over the rim of the strainer; the space between which and the tub is securely packed air-tight with a list of woollen cloth, the whole is then secured by the hoop *f*, the ends of which *f f*, touch each other within the tub, and the hoop, by driving, fits so closely to the sides of the tub, and on the rim of the strained *c*, as to render the whole air-tight, and secures the packing in its place; and, it is farther secured by copper nails driven through it.

Fig. 2, is a section of part of the strainer, on a larger scale, which shows how the strainer, baize, and silk, is packed.

Fig. 3, is an elevation of the whole machine, showing the pump *d*; two cocks *g* and *h*; and a funnel *g*, by which the bottom part may be filled with water, the air escaping at the cock *k* which saves time, as the first stroke of the pump lays the whole weight of the atmosphere on the filters; the cock *h* also serves to regulate or diminish the force of the exhaustion by letting air in again below.

Fig. 4, a tripod or moveable stand, constructed with two hoops, and three legs, about sixteen inches diameter, and two feet three inches high;—*i*, A filter made of a conical bag, placed within

within a hoop, over which the edge of it is returned, and secured by another hoop fitted tight over the first as shewn at fig. 5. *k* A lid to keep the materials clean. This filter rests loose on the tripod, and may be easily changed; another filter may also rest on the lower hoop *l*, to farther purify the liquid when needful.

Fig. 6, shows a simple method of supporting them against a wall, by two rails *l m*, the rail *m* being placed the thickness of the hoop (two or three inches) lower, and forwarder than the other.

Fig. 7, is a screw-hoop for filters of very large dimensions, in which a conical bag of net-work or strong canvas is fixed, to support the filtering medium.

Fig. 8, a thick board, with fluted conical holes in it, to support a number of small filters of cloth, silk, or paper, placed over a bason, as at fig. 9.

Figs. 10 and 11, exhibit the means by which conical bags are formed of a double square of silk or cloth, *n o p q*, fig. 10, folded at *n o*, and the edges sewed in a flat seam from *q* to *p*: and thus half a yard of yard-wide cloth, forms this filter; when the filtering angle at *o*, fig. 11, is worn out, a second may be formed at *n*; first unripping the former seam by the same means, and so on at the other two angles; thus making it both durable and economical, it lasting four times as long as is usually the case with filters.

Fig. 12, is a small filter, formed of a square silk, or cloth, merely by twice folding it across.

Such is the plan of this machine in its most simple form: —It is, however, capable of numerous variations, among which are principally worthy of notice—First, That it may be reversed. Let the under space be *open* to the atmosphere, and the top of the tub *closed* air-tight, except a small opening to

to communicate with an apparatus for *injecting* the percolating liquid, or air, to press upon it; and secondly, the plan, by *exhausting* the under space, may be combined with the present, of injecting the space above; of course, with double power. The purpose, however, for which I filter, will determine the best mode of applying my principle; if such purpose be the purification of liquids, the mode of injection may, in some cases, be the most appropriate; and when precipitates, or the matter to be separated from liquids, is the purpose of filtration, the mode of exhaustion may be the best: in the first case by a *forcing*, and in the latter by a *lifting pump*.

Pure water is so essential an article of life, that a filtering machine is almost indispensable on board of every ship, and in most chemical arts it is highly necessary. The present plan is both portable and compact, equally adapted to sea-service as to domestic use. When applied to the purification of water, it may be used simply as a pump, since the withdrawing of pure water for use, prepares the machine for a new supply, in resemblance of the well or fountain; at the same time that no dirt, or extraneous matter, can possibly get into the purified water. In this latter use, the addition of some sheets of filtering paper, or other proper medium, between the cloths of the strainer will be requisite; but in separating or collecting precipitates (for which this machine was constructed), this addition is unnecessary.

The next article I am desirous of submitting to the investigation of the Society, is an *Air Stove*, being a simplification of the drying stove, formerly honoured by the reward of the Society.

The draft of this stove is so good as to reduce small pit-coal and ashes to a slag, yet the interposition of air between the

the fire and chambers of the stove, so moderates and regulates its action, as never to produce a *scorching* heat therein.

The principle of this stove is applicable also to the heating and circulating of air within a room, for the purposes of health and comfort, as well as drying, either by a *close* or *open* fire-place; and I have succeeded in rendering two remarkably cold rooms exceedingly warm and comfortable by its use.

The heat, and rarefaction of the air, by the iron arch over the fire, causes it to pass in a free current through the ventilator into the room, communicating *salutary warmth without closeness.* The smoke of the fuel passes back under the crown of the fire-place, and rises behind it into the chimney.

I have now to submit to the judgment of the Society, the following plan of a compound press, contrived for the double purpose of pressing by weight and power.

Pressure is a mechanical subject of no mean extent and application, both nature and art producing many inportant purposes by its means. These means are either active, passive, or compound. Active is the application of the mechanical powers, passive by weight and compound when both these are united.

The principal and superior advantages of *pressure* by *weight* are that it is equable, and continuing without attendance. Its disadvantages—That its force is comparatively small, and that the power required to manage it is equal to that which it exerts in pressing, while its comparative bulk is excessive. The principal and superior advantage and disadvantage of *pressure* by *power* are exactly the reverse of those by weight; strong but not continuing—easily manageable, but requiring attendance, and of little comparative bulk.

The

The design in the present plan is to unite these advantages, and correct their disadvantages by opposing them.

I have the honour to be, with great respect, Sir,
your most obliged humble Servant,
GEORGE FIELD.

Heath Cottage, Reading Road, Hounslow, March 20, 1815.

To C. Taylor, M. D. Sec.

Reference to the Engraving of Mr. George Field's Drying Stove and Press.

Fig. 1, is a perspective view of part of the drying stove, showing a vertical section through the flue, between the hot closets, and one of the closets open; and having the three bottom stages separated, to show their construction better.

a The ash-pit in the first or bottom stage, supplying air to the fire *a*, in the second stage; the flue of which pursues the course of the arrows *a a a*, &c. over the air course of the first stage, and under the air course of the third stage, thus making the air very hot, then rising through the third stage at the back corners *a a*, and above the iron floor *c c* of the two closets; the right and left currents unite in one flat or thin flue, extending from back to front between the two closets, (as shown in the section) the partial partition *d*, being put to make the smoke travel to the front, and then back again to ascend the chimney *e*: each course being separated from that above it by cast-iron plates, with apertures in them where necessary. *b b*, The two air courses in the bottom stage, which unite and ascend through the second stage at the back of the fire into the third stage, where they divide again

again right and left, travelling all over the fire flue by the courses shown by the arrows *b*, *b*, *b*, &c. and joining over the fire, they divide; the air being then very hot at *f*, enters into the right and left closets *g*, *g*, fig. 4, where, travelling in a zig zag course between the iron or copper tinned trays in each, they join again in *h*, and the air finally escapes into the flue by the register *i*: the arrows *a*, *a*, &c. showing the fire flue; and the arrows *b*, the air-course all the way to the register *i*.

Fig. 2, is a section of the left chamber, showing the current of hot air between the trays, entering at the bottom *b*, and escaping as shewn by the arrow *b* at top.

Fig. 3, shows how the trays are placed alternately over each other, and are each supported on two iron bars *k*, *k*, &c. let into each course of brick-work.

Fig. 4, a perspective view of the whole stove in action; *a* the ash-pit; *b*, *b*, the air-courses, and the register *i* open; the chamber doors *g*, *g*, shut; *h*, *h*, the top of the flues.

Fig. 5, a compound press for extracting tinctures, &c.; *b* the screw represented in section 1; *m*, a hard metal socket, on which the nose of the screw acts when pressed down with oil in it, fixed fast on the play-board: *n*, *n*, the sides of a cast-iron rim or box to contain two or four square cast-iron weights, to load the press with occasionally; *o*, a bridge or staple, through which the cylindrical end of the screw passes, and is kept from rising out of it by a collar fixed on its nose, by means of a pin passing through it. This bridge allows the loaded play-board to descend without the screw, thus keeping a continual pressure on the substance contained in a bag *q*, &c. to be operated upon, which can be increased or diminished at pleasure, by putting more or less weights into the box; and finally, the power of the screw can be exercised to get

out

out the remaining dregs, as well as to raise the box up again.

Fig. 6, an end view of the press; *p. p*, two of four rollers to guide the play-board of the press.

The GOLD MEDAL *and* ONE HUNDRED GUINEAS *were this Session presented to Mr.* JAMES RYAN, *of Netherton Colliery, near Dudley, for his Method of Ventilating Coal Mines. The following Communication was received from him, explanatory Engravings are annexed, and a Model is preserved in the Society's Repository.*

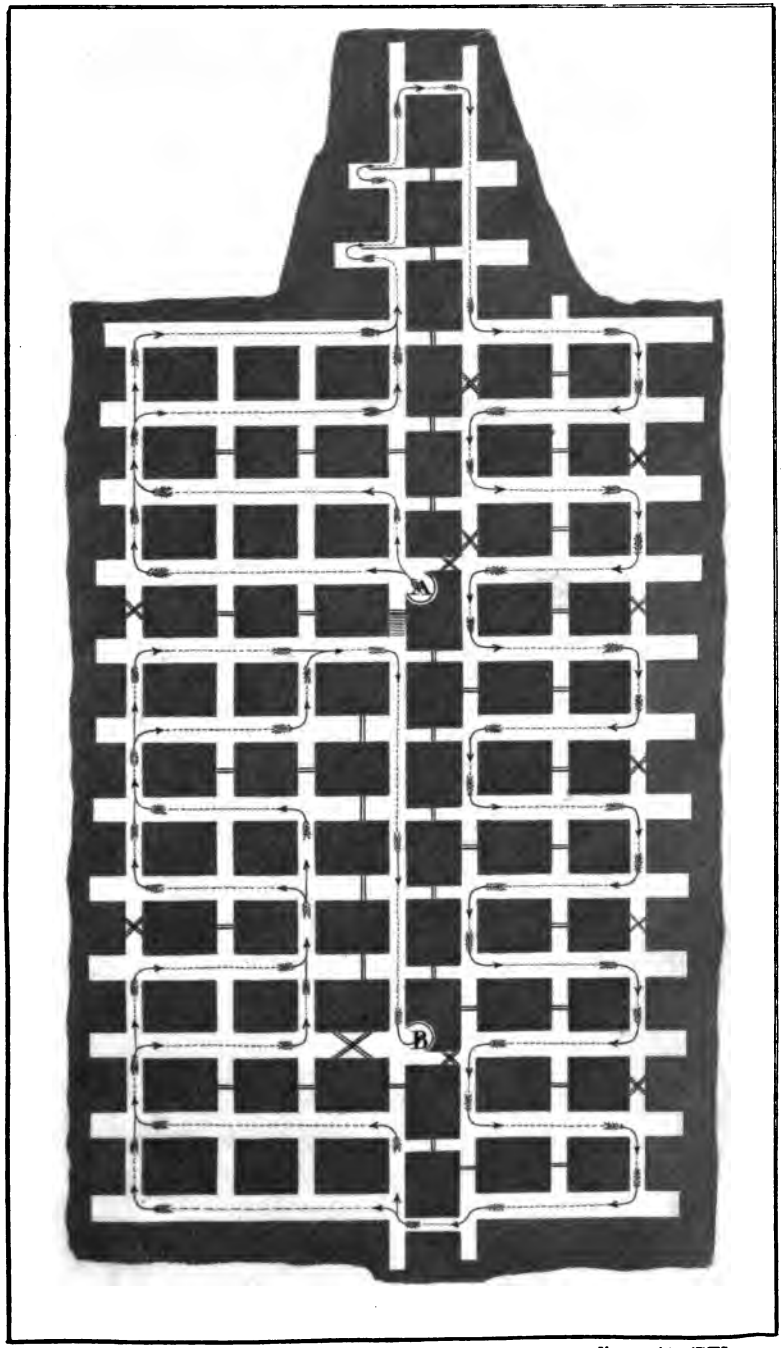
SIR,

THE numerous and melancholy accidents which have happened in the coal mines of Great Britain for a long period, and particularly within the last few years, have attracted the attention of the humane and scientific part of the community to the subject of discovering a better system of ventilation than that hitherto adopted.

Accustomed as I was by my profession to these distressing scenes, humanity soon prompted me to exercise whatever ability, practice and experience had given me, in devising a method to prevent the repetition of accidents so baneful in their effects.

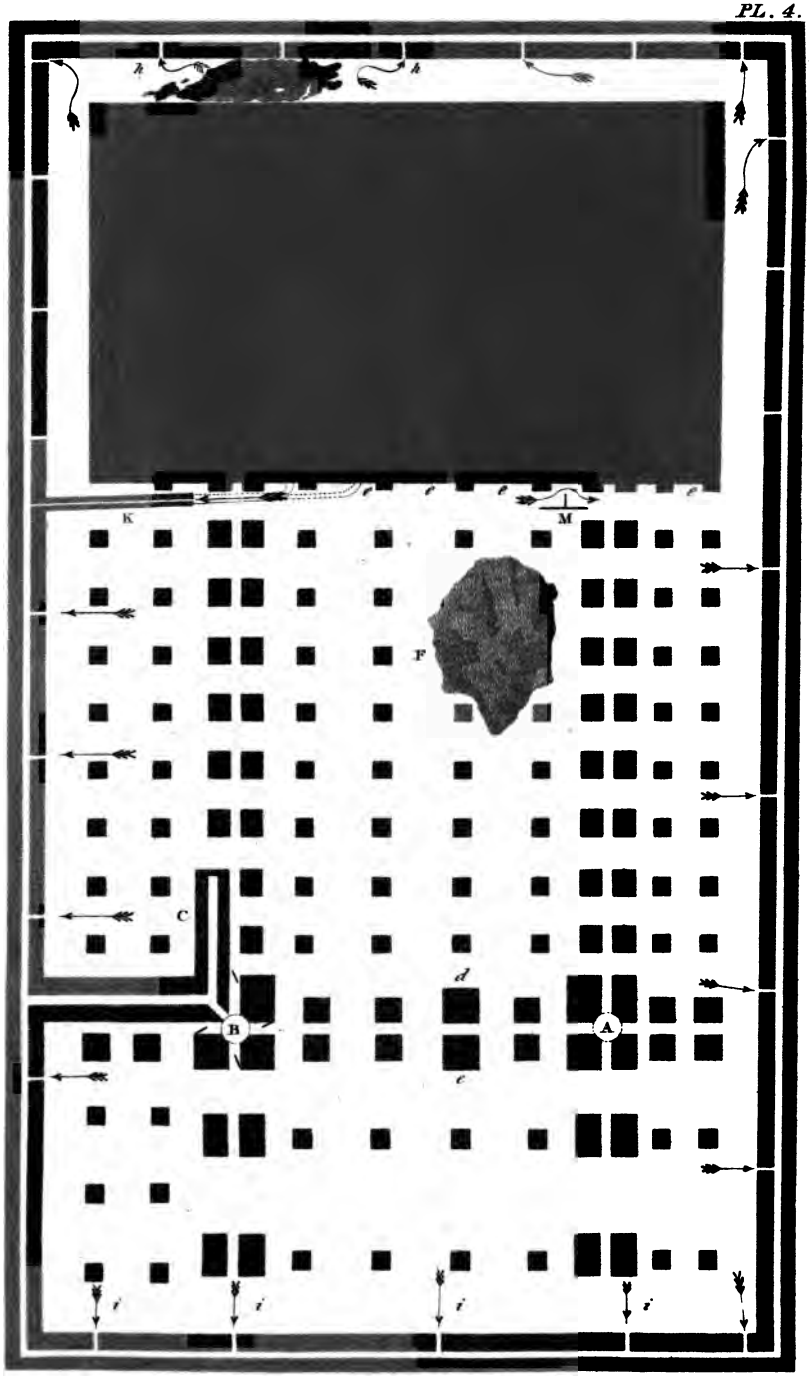
Having brought my plans to a degree of practical perfection, I beg leave to lay before the Society for its approbation, an entire new system of ventilating coal mines, founded upon the results of thirteen years intense application, and nine years actual and severe experience.

Previously



Drawn by C Farley

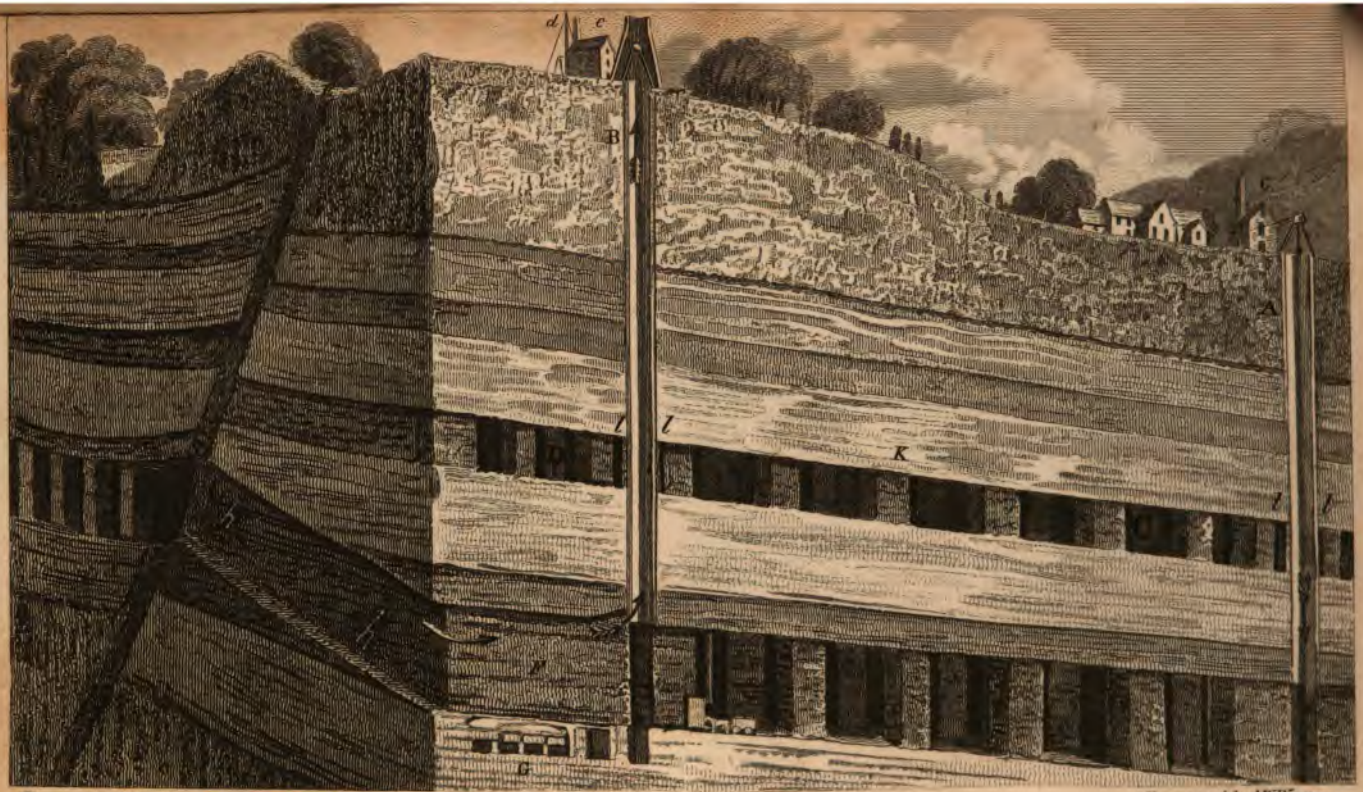
Engraved by A W Warren



Drawn by C. Varley.

Engraved by A.W. Warren.

A Ground Plan of Mr. James Ryans System



Drawn by C Varley

Engraved by A W Warren.

Sections of the Coal Mine at right Angles.

Drawn by C Varley

Engraved by A.W Warren

Sections of the Coal Mine

Previously to laying before the Society the detail of my system of ventilation, it will be necessary to describe the method adopted hitherto.

The annexed plate, No. I., of the ground plan of a Colliery, is taken from the first report of the Society for preventing accidents in coal mines; printed by Edward Walker, Newcastle, 1814.

From this drawing it appears that the ordinary way of working the thin coal seams is in parallel passages, called *boards*, about four yards wide and eight yards asunder; which eight yards comprise a solid mass of coal, supposed to be necessary for the support of the roof, although, in fact, much less would answer this purpose. These *boards* are connected at the distance of every twenty yards by smaller passages, called *headways*, running at right angles: the pillars which support the roof are thus about twenty yards by eight in dimension.

The headways are driven in straight lines through the whole extent of the mine, and are made for the purpose of communication between the boards, in which nearly all the coal intended for sale is raised.

Into each mine two or more *shafts*, or pits, (or one pit *bratticed*, or boarded off, so as to serve the purposes of two) are sunk, by which the coal and water accumulating in the workings are raised. One of these shafts, A, in reference to its use, is called the *downcast shaft*, and the other, B, the *upcast shaft*, by means of which, in addition to its other uses, the gas is carried off. The distance between the two is in general from half to two-thirds, or nearly the whole length of the working. The double lines show the air-stoppings or doors, erected for the purpose of preventing the air from passing into any working, when not necessary.

The

The single lines show the brattices, and the darts and dotted lines, the course of the current of air passing from the downcast shaft through the mine to the upcast shaft, where it ascends.

The system of ventilating Collieries hitherto employed, consists in forming all the boards and headways, or, in other words, passages of a mine, into one immense labyrinth, connected at one end with the downcast, and at the other end with the upcast shaft: this arrangement is effected by fixing up *stoppings*, consisting of brick, or stone and mortar, or strong boards called *brattices*, in such situations as to intercept the current of air in every direction, but that in which it is necessary it should traverse, in order to sweep, as it were, in its course every avenue and corner of the mine. The current of air which enters the downcast shaft, has thus to travel 27 miles in an area of 600 yards square; a distance which it will readily be supposed requires a considerable power to force an effective current through its whole extent: in fact, it seldom happens that the velocity of this current exceeds two miles per hour.

In the first report of a society established at Sunderland for preventing accidents in coal mines, printed in 1814, the following passage occurs, at page 5: "The only method we "are at present acquainted with for preventing accidents by "fire, is a mechanical application of the atmospheric air to "the removing or sweeping away of the inflammable gas, as "it is generated in the workings of Collieries, or as it issues "from the several fissures which the workings intersect in "their progress."

This mechanical application of atmospheric air is produced, according to the above report, in several ways; but all of them have been found either inefficient or dangerous.

Amongst

Amongst these ineffectual contrivances may be reckoned, 1st, The blowing engines for propelling air down the shafts, for the greater part of their power is expended in sending a stream of air through this enormous extent of passage, which stream of air neither operates perfectly in the higher lodgments of the mine, nor in the breaks where gas accumulates.—2d, Falls of water carrying with them a current of air; these render one of the shafts useless for every other purpose, and increase the labour and expences of clearing the mine of water.—3d, The air-pump, which, besides being inefficient to propel a full stream of air from shaft to shaft, deprives the miners of the upcast shafts, while it is at work.

Among the dangerous expedients now in use, it is only necessary to mention the *furnace*, placed near the bottom of the upcast pit, which is supposed to produce the requisite current by the rarefaction of the air within it. Over this furnace all the air of the mine (including of course all the hydrogen gas, mixed in various proportions with atmospheric air,) is compelled to pass.

It is suggested in the report before mentioned, that the furnace should be extinguished the instant an overpowering discharge of inflammable gas takes place in any part of the mine; but the inflammable air may reach the furnace before any previous intelligence of its approach can be given at the bottom of the shafts in time to enable the workmen to extinguish a *chaldron or upwards of burning coals!*

To elucidate still further the present mode of ventilation, (for I consider it essential to bring the two systems in comparison) it may be necessary to state that every coal mine or working is confined to the depth of one stratum, or, in cases where the strata are thin, of two or more, so as not to exceed eight feet in general depth from the roof to the floor of

the mine. The roof, and the floor (or *thrill*, as it is called,) although they are nearly equidistant, are never perfectly horizontal, but incline or *dip* from that position in different angles. From this last circumstance, it is evident that one board will perform a *descending* course, whilst the next *ascends*; thus alternately changing its direction at every turn, and generally leaving a gradually accumulating portion of hydrogen gas at the commencement of every descent, probably mixed with or diluted by atmospheric air, but thus rendered more and more susceptible of explosion on the approach of flame. In Felling Colliery, for instance, the hydrogen gas is supposed to descend in its serpentine course not less than two hundred and fifty feet, perpendicular height, in *each* revolution of the air through the boards and headways. Now, when we recollect that hydrogen gas is so much lighter than common air as to float upon the latter as oil does upon water, it is evident that the hydrogen gas will accumulate in the higher part of every turn or winding of its course, precisely in the same way as the air which lodges in the upper part of a bent water-pipe contracts the passage for the water, and finally stops the current unless propelled with great force.

A similar phenomenon takes place in the coal mines. The hydrogen gas lodges in the upper chambers or crevices until the current of air increasing, and requiring more room, forces the gas into motion, and thus in a state of dangerous mixture or dilution, the two fluids traverse the rest of the workings, seeking the flame which is to arm them with destruction: and here it must be remembered, that the miners *low*, or candle, is equally enabled to communicate explosion as the greatest flame possible: it is believed that all the explosions

plosions at Felling Colliery took place in this way at the upper levels of the mine.

This method of ventilation has frequently been successful when performed in all its detail with accuracy and skill, and under the favourable circumstance of being used in thin coal seams, containing but little hydrogen.

Some of the Staffordshire Colliers were able in this way to clear their six or eight feet seams with a comparatively small loss of life: at last they diluted the inflammable gas to such an extent with atmospheric air, as to produce an unexplosive, and of course a harmless mixture in general; so that this system may not improperly be called the *Diluting System of Ventilation.*

It now remains to describe the method of clearing mines of foul air, by means of what is called the *firing line*, or which, for the sake of distinction, I shall denominate the *firing process.*

This dangerous operation is performed by an apparatus consisting of a long pole, or a series of poles, fitting one into the other, like a fishing-rod, so as to be elevated to the break, or *pot hole*, where fire damp is accumulated: at the upper end of this pole, a copper wire is passed through upon a small sheave or wheel, which wire is made to reach to any distance within the area of the mine from the horse stable: this done, the pole is firmly fixed in the place where the gas lodges; the candle fixed to a piece of lead, or other substance to keep it steady, is carried by the firemen as far towards the explosive region as safety will admit of, when it is set upon the floor, and fastened to one extremity of the copper wire; this done, the firemen retire to the stable, which is made strong, and well secured, in order to barricade them; the other extremity of the wire is passed through a crevice

in the door, by which means they draw the wire until the light gets to its destination:—in some instances they remain pent up for a length of time, in the greatest suspense, owing to some accidental circumstance having put the candle out, before it reaches the *pot hole*; when they are fearful of venturing out, from the uncertainty of what may be the event.

In many instances it has been found necessary to explode these lodgments three times a-day, at each time clearing the mines of all the workmen except the firemen; the necessity of which has been occasioned by the miners cutting down strata or measures of coal, so as to render their roof higher than the general run of six or eight feet seams, and by these means making the extra elevation too great to be effected by the diluting current. In short, when the roof of a coal mine, where the seam is thirty-six feet thick, is cut down, no means but the *firing process* could hitherto suspend, even for a day, the destructive effects produced by an explosion affecting the whole mine.

The expence of this process, besides the loss of many of the firemen, was immense;—It was necessary to leave an unusual substance of coal in the pillars to support the roof against the shocks; the body of coal itself was besides damaged both by the concussion, and by the heat attendant upon the combustion of the gas; a heat which frequently set fire to the seam of coal, and required the stoppage of the shafts for its extinction.

Lord Dudley and Ward, greatly to his honour, employed the most eminent coal viewers from Durham and Northumberland, to devise some expedient by which the calamity might be averted, but in vain;—with all their skill and ability, not a single explosion was prevented.

It

It is in such mines as these, that my system of ventilation has been brought into use to the fullest extent, and with the happiest results.

Having thus described the methods of ventilation now in use, I shall proceed to lay before the Society an outline of the plan which I have successfully pursued for several years, as testified by the certificates herewith transmitted, and to which I request the particular attention of the Society.

The annexed drawing, No. 2, exhibits the ground plan of a coal mine ventilated according to my system, and worked so as to yield a much greater quantity of coal from any given area, at an expence in no case equal to one-third of the former method.

The *white line* round the square exhibits the gas headway, enclosing a given area, and communicating with the upcast shaft at B.

A, the downcast—B, the upcast shaft.

C represents a collateral gas headway, made to carry off the gas, when a dyke, having thrown down the strata in any part of a seam, renders the elevated or upcast side higher than the general level of the main gas course, in which case this is carried to it, as represented at h, h, in drawing No. 3.

The black squares represent the pillars left to support the roof: by comparing those left in the line from shaft to shaft, within the sectional drawing No. 3, the pillars *d* and *e* will how the stronger supports left under any building.

F, a fall of stone or shale from the roof, which merely knocks down a few pillars, without obstructing the ventilasion.

G, part of a coal seam unwrought, with a working round it, interrupted by a fall of the roof at N, which merely stops up one holing or aperture into the gas headway, whilst the

foul air passes through the next apertures, as represented by the darts *h*, *h*.

The cross darts i, i, i, i, show the holings at the lower part of the mine, made into the bottom of the gas headway, and through which the carbonic acid gas escapes upon the water level.

K, a tube, made to carry off the gas from the upper levels of a mine when not supplied with *holings* into the gas course, in the line of its rise as at e, e, e, this mode admits horses to draw under it, which by the system heretofore used is performed by brattices or partitions, as at M: but it is seldom necessary in my plan to make use of this tube.

The darts show the manner in which the gas creeps off into the gas headway.

Drawing No. 3, exhibits the section of a coal work, with a dyke or *fault* by which the strata are thrown down; and representing the machinery, shafts, &c. used in working coal.

A, the downcast—B, the upcast shaft, having a roof to cover the machinery, and mouth of the shaft, to shelter the *banksmen*, and prevent torrents of rain, &c. &c. from turning the course of the air.

C C, steam engines; d, a rod for conducting lightning, to prevent its firing the gas issuing from the upcast shaft.

E, a dyke, by which the strata are thrown down.

F, the main gas headway, with a rarefying furnace of steam G; h, h, a collateral gas headway to draw off gas from the coal thrown up by a dyke (see C, in ground plan, No. 2.)

K, represents a seam of coals partly wrought out, with the shafts stopped up at l, l, l, l; in order to force the current of air down to the lower seam, and prevent it or the gas from entering the waste.

In

In working the gas headway through the higher parts of a mine, the under strata are bored every twenty or thirty yards a few feet through, in order to draw off the gas from the lower strata. When an open or porous incumbent stratum lies near, the gas may sometimes be let off by boring into it.

If the old system of ventilation is to be abandoned, the pillars left to support the roof may be re-worked to a considerable extent: in my system, pillars will be left without any regard to, or necessity for regularity, so as to afford sufficient support to the roof, and to every locality which may occur to make precaution necessary; by which means much more coal will be obtained from a given area.

Although it may be only necessary to cut a very few yards from the pit or shaft to get on the highest line in the coal field, to effect the mere purpose of ventilation from hydrogen gas, yet it is important to have a thorough knowledge of the stratification to enable me to carry on my future operations with advantage. In the working of coal, an excavation, or gas course, should be driven sometimes entirely round the works for the inflammable and vitiated air, which, being lighter than common air, will go off by the higher level. The carbonic acid gas will from its gravity seek the water level, or the lowest parts of a mine, as shown at i, i, i, i, in Drawing, No. 2.

The dimensions of the holings or apertures into the above gas course, must be judged of from the quantity and relative specific gravity of the gasses which they are intended to receive.

The surrounding of coal fields by headways is generally practised by every intelligent director, as the risk run without such a precaution is very great, and many lives have

been lost, and works shut up from an ignorance of the stratification, a knowledge of which would have been acquired by driving the headway. This course also secures the miners against all sudden irruptions into old wastes, which might, and frequently do, let in water, accumulations of gas, &c. upon the men. In cutting it, the different dislocations met with should be noted down, with their angles, bearings, &c. and transferred to the map, made to govern the general arrangement of the works as the colliers advance. A director who has his field once surrounded, is enabled to examine every part geologically, and can proceed without fear of danger from any quarter: and, as he requires a greater extension of his field, he has only to drive a line off from this common gas passage to still higher parts, should they occur.

The gas-course should be attached to the drawing, or upcast shaft, by two folding doors, one of which should be made to close before the other opens; by such an arrangement, coal can be safely drawn up at the upcast shaft, as the trap or folding doors will prevent the common air from communicating with it: the gas-head should be made to discharge itself a few feet, say ten or twelve, up the shaft, so as to prevent the possibility of flame approaching the gas on its entering the bottom of the pit; with this precaution, lights may be kept in some lower point, on the opposite side of the shaft to that which the gas enters.

The holings, or small gas courses, made into the main gas head-way, must necessarily accompany the works as they advance; or, in fact, it is better to have them made as far forward as possible: the *holings* into the gas-course from the board, or headway adjoining it, may be made with a boring-rod of three inches in diameter, or, if necessary, of a greater diameter; which will be sufficient to carry off the hydrogen gas

gas generated in their neighbourhood: but the principal passage for the gas must be at the very highest part of the workings, into which hydrogen gas, azotic gas, and finally cold air, will flow in succession; but the backs and slips should be mostly depended on to effect ventilation.

It is supposed that by the old system a standard current of air moves through an aperture of thirty feet area, at the rate of three feet per second, which equals 5400 cubic feet per minute; and that this is capable of diluting about twenty-eight and a half feet of gas per second, or one thousand seven hundred and ten feet per minute, so as to render it perfectly harmless; this however only gives three parts of air to one of gass, which, supposing the equality of this proportion, must render it an explosive mixture. But this dilution *is not* regular, nor does the gas distribute itself equally; for in some parts the hydrogen remains nearly pure, and in others diluted beyond the explosive point; but in the higher parts of a mine, a great collection may always be expected, mixed up to various points of explosion, and more particularly at the last of the air, as the accumulations of every other part of the mine must pass through it.

By a gas-head of the same capacity, in my system, I can, according to the above rate of three feet per second, bring off ninety feet of gas in that time; but if the gas be pure, its travel or rate of going will be in proportion to its levity, and the rarefaction in the gas headway. I reckon, therefore, upon the rate of at least ten feet per second, which would carry off 300 feet of gas each second, or eighteen thousand feet per minute: but this generation is far more than can be presumed upon in any mine, so that the extremity of security, afforded by my system, would probably never be put to the test: the distance of its course in a coal-field of nine hundred

hundred yards, will seldom exceed twelve hundred yards. A part of the old works being left with good stopping, will answer the purpose with little alteration of gas headways in my system. But if the gas-course is to be cut in the solid coal, an excavation may accompany it, as described round the upper part of the ground plan, Drawing No. 2, as a board to get coal from; this will take off the gas as it is extricated, and will prove a common passage for the air, which has full liberty to flow through the mine, but on its departure up the shaft will be preceded by the lighter fluids, into the gas-course.

To elucidate my system still further, I will introduce the following analogy: If a large thin book be placed in a slanting position on a bed of clay or stone, and covered with another bed or stratum, equally impervious to gas, it may represent a seam of coal, which is separated into laminæ, correspondent to the leaves of paper. This is precisely the case in these mines, where the seam of coal runs out to the surface uninterrupted by faults: in such mines explosions are never known.

But when the seam is separated by a fault (as shown in Drawings No. 3 and 4,) which, to pursue our illustration, may be imitated by cutting the book in two, with its supporting and superincumbent strata of clay, raising or depressing one portion until the leaves of the book no longer touching each other rest against the clay, and *vice versa*; such a fault it is evident will no longer permit the free transmission of the noxious gas into the atmosphere, from the portion of leaves situate below the fault, whilst that part which still presents its higher edge to the surface, continues as safe as before: in this case, I bore a sufficient quantity of holes from the seam below the fault, or downcast, to the seam above

above it, or upcast, in order to let the gas pursue its course as represented by the section, Drawing No. 4. letter A.

The Netherton and Buffery Collieries in Staffordshire have for many years required the terrific explosions of the fire-line before mentioned, to enable the miners to work them at all, whilst the next coal field, separated from them merely by a fault a few yards thick, but which has thrown its strata fifty yards higher, is entirely free from accumulations of gas.

When these interruptions to the free escape of the hydrogen gas into the open air take place, it naturally forces itself into the workings, through the largest fissures it can find, issuing out in a continual and powerful stream, which the workmen denominate a feeder or blower. By the diluting system, the gas which *thus* issues from the coal is made to traverse all the workings between the blower and the upcast shaft, remaining, it is true, on account of its levity, in the upper part of the courses; but thus insuring its ignition, through the whole extent, if unhappily it comes in contact with flame *.

But when, as by my method, the draught, instead of sweeping through the whole mine, is directed towards those places only in which (from their being situated above the natural current) the hydrogen gas can lodge, it is evident that the fluid, instead of being diffused through the works, is confined to the course which I prescribe to it, and therefore takes the shortest and most ready means of escape.

* Should it escape the miners' lights, the only remedy according to the old system is to extinguish the furnace at the bottom of the upcast shaft. Admitting that it were possible to get the fire extinguished in time: would not this be weakening the ventilating current, precisely at the moment when it is most necessary to increase its velocity?

In

In a mine where the circulating current is thus, in a great measure, kept from admixture with hydrogen gas, I have never found any danger to arise from setting fire to the blower at the point where the gas issues into the works; and by inserting an iron pipe, I have often directed it so as to give light to the workmen.

But when I had driven or bored the top-heads or holings leading into the gas-course from the roof of the mine, and bored the superincumbent strata, as in Drawing No. 4, so as to connect the laminæ with the gas-courses, *the light from the blowers always died away*, and they ceased to discharge gas.

In the old system, this circumstance is frequently produced by the falling-in of the roof, and the formation of what is termed a pot-hole, (an accident so frequent, that it requires the employment of several men in every mine, merely to watch and give notice of it), or from the works intersecting a fissure in the coal; and produces such an increase in the quantity of gas, that the atmospheric air is insufficient for its dilution, and by thus rendering it necessary to augment the power of rarefaction, collects a quantity of burning fuel at the furnace, that cannot be speedily extinguished.

Pursuing the comparison before made of a lodgment of air in a bent water-pipe; what would be thought of the engineer who should endeavour by force to drive it before the water, encountering in its progress perhaps twenty such bends, in preference to the application of a simple tube into the bend where the air lodged? yet such is the process of ventilation hitherto adopted.

But this is not the only evil resulting from the present system:—when approaching old and abandoned workings,

in

in which the inflammable gas has been accumulated for several years, if through the neglect of the director, the workmen proceed without the precaution of boring, as soon as a pick-axe penetrates into the open space of the old coal mine, the gas rushes out and ignites by their candles, and if the mine in which they are at work should be in a state of explosive dilution, the dreadful effects may easily be anticipated.

In my system, if by any chance such an accident take place, the consequences are trivial; the eruptive gas, instead of being confined to take its course through a labyrinth of foul air, spreads at once by its levity and elasticity, under a roof of several thousand yards extent, and this the more certainly and rapidly in proportion to the previous purity of the air contained in the mine: here it may burn without danger, and almost without inconvenience to the miner, who pursues his labour below this thin sheet of flame: in a short time it would find the higher levels, and ultimately steal off through the holings into the gas headway, while the men in that direction would naturally descend to a lower part of the workings until it had gone off; even the workmen in the gas course, although they might some of them be scorched, would not perish, as the accelerated velocity created by inflammation would confine the flame to the roof of the gas headway; a fact which has been proved by two instances in Buffery Colliery, at one of which I was present.

Having thus laid before the Society my new method of ventilation in all its details, as succinctly as the importance of the subject will admit, I now beg leave to state what has been

upcast shaft, thus converting the air-head to a gas-head, and enabling the gas to escape by the shortest way.

Previously to the above period, Mr. Fereday had purchased the Buffery Colliery, where a large sum of money had been lost by the effects of its explosions; this Colliery I took charge of, notwithstanding its daily explosions had swept off numbers of men; and, in three months, I rendered it sufficiently safe for the Colliers to disuse the fire-line. These facts are certified by the Letter from Mr. Fereday to Mr. Burn, and by Certificate No. 1.

In consequence of these proceedings, and the numerous distressing accidents which occurred in the northern English mines, a letter was sent from the Society for preventing accidents, &c. to Samuel Fereday, Esq. for the purpose of ascertaining how far my plan had been introduced, and what had been the results; to which the following answer was returned:—

Mr. Wm. Burn.

Bradley Iron Works, Nov. 1, 1814.

Sir,

On my return from a journey, I find your favour of the 15th ult., and, in reply, I beg leave to state, for your information, that I am fully satisfied with the happy results which have taken place in this part of the country by the adoption of Mr. James Ryan's method of ventilating mines, and have no hesitation to say, that many hundred miners are now at work in several Collieries in which I am concerned, that, but for this blessing, would in all human probability have long ago fallen victims to the explosions of hydrogen gas, and which, before his plan was adopted, were so frequent. It gives me great pleasure to hear of the establishment,

ment of an institution which has for its object the amelioration of the condition of so valuable a class of our fellow-men; and shall be happy, if it lies in my power, to promote its views. If any information I can afford you will have that tendency, I beg you will not hesitate to apply to, Sir,

Your most obedient Servant,

SAMUEL FEREDAY.

To MR. WM. BURN.

Southwick, near Sunderland, Durham.

In the mean time I received communications relative to these inquiries, and wrote to the above Society respecting my system, in July, 1815. I received the following letter:—

Southwick, 14th July, 1815.

SIR,

YOUR letter of the 12th ult. and former one have been duly received by me, and laid before the Committee appointed by the Society for preventing accidents in coal-mines. The Committee have since made the necessary inquiry of Mr. Fereday, whose report seems satisfactory; but they have had no answer from Lord Dudley and Ward; they have also otherwise endeavoured to satisfy themselves of the efficacy of your method. The result is, that they are strongly inclined to think that it may turn out to be found a highly important one, and they wish, on that account, to make it at present an object of their particular attention. It may be proper, however, to state to you, that this Society and Committee consist of few persons immediately interested in coal-mines. They have been prompted by humanity alone to endeavour to prevent the fatal accidents that are happening in the Collieries: their funds are at present hardly adequate to any other purpose than that of inquiry and information.

I have therefore to request you to say how far any satisfactory experiment can be made, at an expense within their compass, in a coal-mine here, so as to bring conviction to the coal-owners, that your method, if generally adopted by them, would give the security wanted. The Committee would therefore be obliged, if you could propose some plan of experiment to be made in this neighbourhood, or would yourself undertake such an experiment as would convince them of the entire security of your method, and would be likely to answer the purpose of satisfying the coal-owners here. If the Committee should find it to correspond in point of effect with what they wish, you can have no doubt but that they would endeavour, by all the means in their power, to procure the compensation that such an excellent discovery would well deserve. Be so good as to drop me a line in a post or two.

I am, Sir,

Your obedient Servant,

WM. BURN.

To Mr. JAMES RYAN.

In consequence of this letter, and the inducements therein held out, I left Ireland, where I then was, in August, and proceeded to make such experiments as might answer the views of the Society; after several conferences with the Committee, and particularly with the Rev. Dr. Gray, Dr. Pemberton, and Dr. Clanny, I went over to Newcastle, in order to procure a trial of my system; but did not find any inclination on the part of the agents, &c. to assist me. After I had been there a short time, I wrote to Dr. Gray, as an active member of the above institution, wishing him to exert his influence, and received the following answer:—

SIR,

SIR,

AGREEABLY to your request, I have written again to Mr. Buddle, having before addressed him on the subject of your experiment.

I hope that you will be allowed to make it where you wish, and under favourable circsumtances. With every good wish for your success, and hoping to hear from you soon, I subscribe myself in great haste,

Your obedient humble Servant,

Sunday Evening. ROBERT GRAY.

This letter enclosed one to Mr. Buddle.

Notwithstanding this, however, I found nothing but apathy prevailing relative to any improvement in a system which had by its destruction proved itself so ineffectual; and the circumstances I before detailed will not make it appear extraordinary that considerable impediments were thrown in my way. Before the outline of my system was known, objections began to be started, and in a short time a deputation was sent into Staffordshire to make inquiries about my system; but, unfortunately for me, they preferred the opinions of men whose situations rendered them averse to my plans, to those of the honourable and independent characters I have before mentioned.

On their return, armed as they were with the almost absolute sway over the Durham and Northumberland mines, and additionally supplied with the partial opinions they had collected on their excursion, I found it in vain to argue the merits of my system, as the opposition was too powerful for my individual exertions. I therefore, after much trouble and expence, left Newcastle on the 24th of December, 1815,

and determined to seek justice from a Society where liberality and science prevail.

Before I conclude, I wish to make one further observation on my system. It has been objected, that my gas-courses are equally liable to falls of the roof as what the mine is; this however is erroneous; for, not being intended, like the mine-boards or passages, for the supply of coals, but merely to give passage to the noxious gas, they are comparatively small, and carefully strengthened throughout; in them nothing is left to chance, and this security is effected at very little expence, as their extent is very small compared with the courses in the old method, and, being able to work some part of them in the dark, there is no danger of explosion; but, aided by Canton's phosphorus, or if this should not yield sufficient light, by any safety lamp, I should feel myself perfectly secure in making the preparatory passages through a seam of coals; or, under any other circumstance, where an explosive mixture might for a time prevail.

I beg once more to express my gratitude to the Honourable Washington Shirley, for his indefatigable exertions throughout this cause, and in which he was most zealously seconded by that sincere friend to humanity, the late Rev. Mr. Cartwright, a most upright and intelligent brother magistrate; and to Dr. Thomson, Wm. Allen, Esq. F. R. S., Alexander Tilloch, Esq., the Rev. Mr. Turner, of Newcastle, and Anthony Clapham, Esq., of the same place: to whom I am likewise under great obligations for their assistance.

I have the honour to be, Sir,
Your very obedient Servant,
JAMES RYAN.

CERTIFICATE,

CERTIFICATE, No. 1.

As inserted in the Birmingham Gazette, January 1, 1810.

WE, the Charter Masters of the Buffery Colliery, near Dudley, in the county of Worcester, having suffered material disadvantages from the destructive effects of the vast quantities of inflammable air with which the works were charged, and being conscious of the serious losses sustained by the late proprietors on account of the numerous victims to its ravages, and the impossibility of working the mine while so dreadful a body existed in it, think it incumbent on us to declare, that Mr. J. Ryan, who was engaged in July last by Mr. Fereday, the present proprietor, to ventilate the pits, No. 2, 3, 4, has successfully superseded even the necessity of firing-lines, &c., which before were unavoidably in daily use, to the great terror of the men.

The sensations produced in the minds of the men by so desirable an alteration will be productive of the most beneficial consequences to the mining business, as it is now prosecuted with pleasure and success; and we at once acknowledge our obligations to Lord Viscount Dudley and Ward, the Honourable Washington Shirley, the Rev. Joseph Cartwright, and Samuel Fereday, Esq. for patronizing so invaluable a discovery, and congratulate our fellow-labourers on the prospect of security from such terrible destruction.

WILLIAM TURNER, his mark ⋈,
Charter Master at No. 2.
JOSEPH HATELY, his mark ⋈,
JOSEPH MANSEL, his mark ⋈,
Charter Masters at No. 3.
SAMUEL SOUTHAL, his mark ⋈,
THOMAS SOUTHAL,
Charter Masters, at No. 4.

(Witness) JOSEPH FEREDAY,
Buffery Colliery, Dec. 1, 1809.

CERTIFICATE, No. 2.

THE numerous lives lost in Lord Viscount Dudley and Ward's Collieries by inflammable gas, and the excuses made use of to account for it, left no doubt in our minds as to the fallacy of the system acted upon. Mr. Ryan being employed in 1808 to ventilate the dangerous works, he succeeded beyond our most sanguine expectations, without recourse to the former expedients, which were both expensive and dangerous; being employed to open new works, he never suffered them to accumulate gas; which made the agents say, that it arose from natural causes. To convince them, Mr. Shirley allowed him (Mr. Ryan) to withdraw his system: in two days the agents reported the works to be so infested with gas, that it would be impossible for Mr. R. or any one else to free it, without recourse to the former expensive system, which would take some months to execute. Mr. Ryan then engaged to clear the works in *six hours*, and risk his life in the performance of it; which was executed on the 12th of June, to the entire satisfaction of Messrs. Fereday and Smith, who attended to inspect this trial. Mr. Ryan's system is not effected by the weather, and appears well calculated to guard against incendiaries. On the occasion beforementioned, the agents of Lord Dudley and Ward privately stopped up the air-courses, which had it been done on the old system must inevitably have been attended with death. We have no hesitation in saying, that during a course of experiments for two years and a half, in the most dangerous works, without firing-line or any other expensive precaution, he did not lose one life, neither was any one rendered incapable of labour; and the

effects

effects of his operations are still visible and evident in the works.

W. SHIRLEY.
SAMUEL FEREDAY.

London, April 26, 1811.

CERTIFICATE, No. 3.

JOSEPH HATELY, Charter Master at the No. 3, Buffery Colliery, will, upon oath, if required, prove that his pit was the only one the gentlemen from Newcastle went into at the Buffery, and they put the following question to him :—

Was you troubled with fire before Mr. Ryan was employed ?—I answered, that we used the firing-lines regularly before, and have not used them since; that the method used by Mr. Ryan was not in practice to my knowledge before Mr. Ryan introduced it; and that we are not in fear or danger of fire at the present time; that my employers, Mr. Jones and Mr. Joseph Fereday, directed me to take them into the pit, and to tell them the truth.

The signature of JOSEPH HATELY,
Witness to the signing, MICHAEL BILL.

Buffery Colliery, 3d February, 1816.

CERTIFICATE, No. 4.

Percy street, Newcastle, Nov. 5. 1815.

SIR,

IN compliance with your request, I have no hesitation in repeating what I stated to the first meeting at the Assembly-rooms; that having in June last had some conversation with Mr. Baddaley, of Dudley, on the accidents which have lately happened in this neighbourhood, and having asked in my turn respecting the accidents in the Dudley coal-mines, I certainly understood him to say, that they had been much

fewer, from the explosion of inflammable air, since a person of the name of Ryan had been in that neighbourhood.

I am, Sir, &c.

WM. TURNER.

To Mr. JAMES RYAN.

CERTIFICATE, No. 5,

From the Tyne Mercury, 12th Sept. 1815.

At a meeting holden on the 9th of September at the Assembly-rooms, in Newcastle-on-Tyne,

Resolved—That Mr. Ryan, having submitted to us his plan of Ventilating Mines, we do highly approve of it as consistent with the principles of philosophy, and that we recommend it to be taken into consideration by persons interested in the coal mines.

R. W. GRAY,	CHRIST. BENSON,
WM. TURNER,	WM. CLARK,
J. H. BIGGE,	WM. ARMSTRONG,
N. JOHN WINCH,	DIXON BROWN,
J. CARR,	ROBT. W. BRANDLING,
JOHN HODGSON,	ANTHONY CLAPHAM.

CERTIFICATE, No. 6.

Walker's Hotel, Bridge Street, Blackfriars, May 2, 1816.

DEAR SIR,

I WAS from home this morning when you called, which was rather a disappointment to me; however I answer your letter with great pleasure.

Certainly, I do recollect when you were at Buffery Colliery, and but for your plans, though I cannot say I am fully acquainted with them, but I now repeat from my father's ideas of ventilation, I do believe there would have been a great

many

Drawn by Cornelius Varley.

Engraved by A.W. Warren.

Doctor Clannys Safety

many more lives lost than there has been of late. And when I recollect the time you, with many others, ventured down one of the pits at Buffery Colliery, which had been for some time stopped up, and cleared it of the inflammable gas, I must own I was quite surprised.

When the explosion took place at Mansell's pit, I recollect it was the opinion of every one present, that all the men then down were certainly lost,—but, to my great astonishment, not one was hurt.

I remain, Dear Sir,
Yours, &c. &c.

DUDLEY FEREDAY.

To Mr. JAMES RYAN, &c.

The SILVER MEDAL *was this Session voted to* DR. CLANNY, *of Bishop-Wearmouth, near Newcastle, for his Safety Lamps. The following Communications on the Subject were sent to the Society, and the Lamps are preserved in its Repository.*

SIR,

DR. CLANNY having forwarded two lamps to me, from Sunderland, which he is desirous of presenting to the Society of Arts and Sciences, for some mark of its approbation, I have to request that you will have the goodness to signify his wishes to the Society.

The Lamps are for preventing explosions in coal mines; one of them being an improvement and modification of his original lamp; and the other upon a new and interesting principle.

When

When before the Society, I shall be happy to attend to give any information in my power, in regard to their application, and to testify the experiments which have been made upon them by Certificates given at the time.

I have the honour to be, Sir,
Your most obedient humble Servant,

J. H. H. HOLMES.

Adam Street, Adelphi, 14th April, 1816.

To C. TAYLOR, M. D. SEC.

The Steam Lamp.

THE principal nicety requisite in the management of this apparatus, is its first preparation for use, as it is necessary to produce a sufficiency of heat within the lamps to establish a current air.

Some boiling water being put into the cistern, within the lamp for about one inch and a half high, the top should be put on, and the oil lamp attached to its place; this done, the cistern and lamp may be affixed within the Chamber, leaving five or six minutes to heat the lamp before the bottom is put on. In the first instance, a condension will take place, and cover the glass with steam; this will, however subside, or, if the bottom is taken off, and the glass carefully wiped, a recurrence of the same thing will not take place.

The Blast Lamp.

IN using this lamp, the bellows are placed under the right arm, like a bagpipe player, and, an elastic air tight tube fixed to their muzzle as an end, and the conducting tube at the

the other, which, when the bellows are urged, conveys the air for supporting the combustion of the candle.

By fixing the bellows to the end of the conducting tube, as now attached, the above means will be ascertained.

The lamp should be nearly filled with oil before the burner and oil aperture are put in:—the condension, which shortly after lighting the wick covers the glass with steam will soon subside, and the glass become clear. Some improvement is proposed to be made in this lamp by having the bottom to fix on in a different manner, and so as to be more air tight.

The lamp is to be suspended by a belt, on the left side.

The following Letter was addressed to Dr. CLANNY, *by* Mr. WILLIAM PATTERSON, *Engineer to the Painshaw Law Colliery.*

SIR,

IN answer to your letter of yesterday, I have the greatest pleasure in stating to you, that your original safety lamp for the prevention of explosions in coal mines, which has been known to the public for many years, and which, in your own hands, accompanied by Mr. Holmes and myself, afforded the first safe light in a coal mine, charged with inflammable air, is now in constant use in all cases where light is required in the Herrington mill pit, and that in no instance has the light ever failed, nor is there the smallest chance for the occurrence of any accident from fire-damp where this valuable lamp is used.

Some time ago I descended the engine pit, which, from foul air, had not been visited for nearly two years, with any sort

sort of light. In this pit the water was in such quantity, that the lamp and myself were on all sides enveloped by it, and no lamp with apertures or wire gauze could have afforded me a light for five minutes; yet here, surrounded by fire-damp and water, the candle continued to burn, and I came to the bank with the light unextinguished. The necessity of supporting combustion in this lamp by a pair of bellows is abundantly compensated by the safety and brilliancy of the light. In both of these respects, I will venture to affirm, without fear of contradiction, that this lamp excels any other hitherto offered to the public; all of which have been constructed upon your plan of insulating the light.

It was, I know, your benevolent intention that each of the poor pitmen's children, who were competent to the task, might earn six or eight pence a day by keeping the bellows going. But as this manual labour has been objected to by some, it affords me additional pleasure to be able to give you a most favourable report of your new lamp, which supplies itself with air, and in which explosion is completely prevented through the medium of steam. Your trials of it in the presence of Mr. Ward, and of my son and myself, on the 30th ult. in an atmosphere of fire-damp of the most powerful nature, as expressed in the annexed Certificate, gave me the greatest confidence in its perfect security; and the following day I carried it into those most dangerous places of the Herrington mill pit, where you first used your original lamp, and in all instances it continued to give a clear light in perfect safety.

When the lamp was carried into an atmosphere of fire-damp at the firing point, the flame increased in magnitude,

and

and sent off flashes of a blue light, but, as they were very slight, the flame at the wick was no way changed, except as stated above. As you formerly remarked to me, so it occurred. The flame was steady, and continued to burn at the wick under every change and modification of the air. This circumstance gives your new lamp a decided superiority over every other.

I will not take up your time by spun-out descriptions of the effect produced, and appearance observed in the determined and decisive trials which I made with your lamp in places of the mine where no persons ever approach with a candle. I am persuaded, that, as your endeavours for the prevention of explosions in coal-mines have been both laborious and expensive, and compleatly effectual, you will receive those rewards you eminently merit, and which are due to you alone. You were the first who turned the attention of the public to the subject of safety lamps, without which a perfect system of ventilation could never be obtained in the coal mines of this district, nor the working of many of them be carried on. Of these safety lamps, you was the first and original constructor, and you was the first to descend into a dangerous mine, and make the necessary trials in an atmosphere of fire-damp at the exploding point. Of all these trials at the shaft and in the mine, I am proud to acknowledge that I had the honour to be your companion.

I have employed your improved original lamp on an atmosphere of fire-damp, in the Herrington mill pit, with complete satisfaction. In it the light was truly brilliant, and though your first, or original lamp, required no machinery or philosophical knowledge to direct its use, and was by no means expensive, yet your recent improvements have rendered

dered it almost a new lamp. The œconomy, the portability, and simplicity of this lamp, require no comment from

Your obedient humble servant,

WILLIAM PATTERSON.

Engineer, Painshaw Law Colliery.

To R. CLANNY, M. D. Bishops Wearmouth.

Experiments made with Dr. CLANNY'S *Lamps.*

THIS day, we the undersigned witnessed the experiments made with Dr. CLANNY'S two new lamps in a field of inflammable air, at the firing point.

In the lamp with oil as a valve, the fire damp was burnt at the wick, and there continued to burn for a considerable length of time, till the quantity of atmospheric air was so diminished by the increase of the inflammable air, that the light was extinguished from that deficiency alone.

In the lamp in which steam forms a perfect valve, the same effects followed when it was used in a field of fire-damp at the exploding point. In both instances the light was permanent, and would have continued so, had the atmospheric air not been ultimately over-balanced by the inflammable air.

In our opinions, these lamps are the only ones hitherto discovered, which can afford a safe light with inflammable air in the midst of a field of inflammable air; and, that the fire-damp or inflammable air will, in all instances, be overcome, and ultimately destroyed by using these lamps alone.

Given under our hands, at the Herrington Mill-Pit, this 30th day of March, 1816.

(Signed) J. R. WARD,
W. PATTERSON,
W. PATTERSON, jun.

Reference

Reference to Dr. CLANNY's *Safety Lamp, Pl. 7.*

Fig. 1, section of the lamp: *a* the pipe into which the flexible tube of the bellows is fitted. The air is forced down this pipe, and rises at *b*, through the oil: *c*, a plate or false bottom, perforated with holes; this supports the cotton, and prevents the portion of oil at bottom, (which is needful to cover the air pipe,) from being consumed: *d*, a curved pane of strong glass: *e*, the plate round the burner, full of holes, by which the air is supplied, near the flame: *f*, the chimney: *g*, a piece to be added at the top of the chimney. This chimney is so much excluded, that when an explosion takes place in the lamp, the flame will not reach the top, so as to communicate with the outside; and the oil cuts off all communication with the feeding pipe: *h*, the bellows: *i*, *i*, straps and buckle to fasten round the boy's waist: *k*, *k*, two cushions to bind the bellows steadily to his side, and leave room for supplying the air-hole.

Fig. 2, the two inner parts of the lamp separated. The lower vessel contains the oil, and is wrapped round at 1, with leather or soft thread, to render it air tight: the part *c*, is open at bottom.

The Drawing shows the lamp slung to the boy's neck, and the bellows strapped to his side; the pipe is placed behind, and passing under his left arm, is inserted into the lamp.

PAPERS

IN

POLITE ARTS.

THE SILVER ISIS MEDAL *was this Session voted to Mr.* C. PYE, *of No.* 27, *Euston-place, Euston-sq. for preparing Charcoal to answer the purpose of Black Chalk for Drawing. The following Communication was received from him, and Specimens of the Charcoal are preserved in the Society's Repository.*

SIR,

HAVING prepared charcoal to answer the purpose of black chalk drawing, I forward, for the inspection of the Society, a few specimens, and should be highly flattered if they meet the approbation of the Institution.

I am, Sir,

Your obedient humble Servant,

CHARLES PYE.

No. 27, *Euston-place, Euston-square,*
17th November, 1815.

TO C. TAYLOR, M.D. SEC.

SIR,

YOUR reply to my communication to the Society relative to *prepared Charcoal for drawing* demanded a more satisfactory answer than I was enabled to send, from the short time allowed me to reply to your letter. At that time I was not prepared with such experiments as I wished to forward, and, on that account, I was induced to wave the subject until I could furnish the Society with pencils made from the preparation. I have now the pleasure to enclose some specimens, which I hope will be deemed satisfactory, accompanied with an account of the process of preparing the charcoal.

I was led to this discovery from the difficulty of preserving *black lead sketches* and *drawings*; and, from frequently experiencing great inconvenience from their being rubbed and obliterated.

Charcoal prepared in this way appears to me to answer the purpose of lead, where it is requisite to be permanent, not only in making drawings, but in writing memorandums also. Should the Society require any further information on this subject, it will be communicated with pleasure, by your

Obedient humble Servant,

CHARLES PYE.

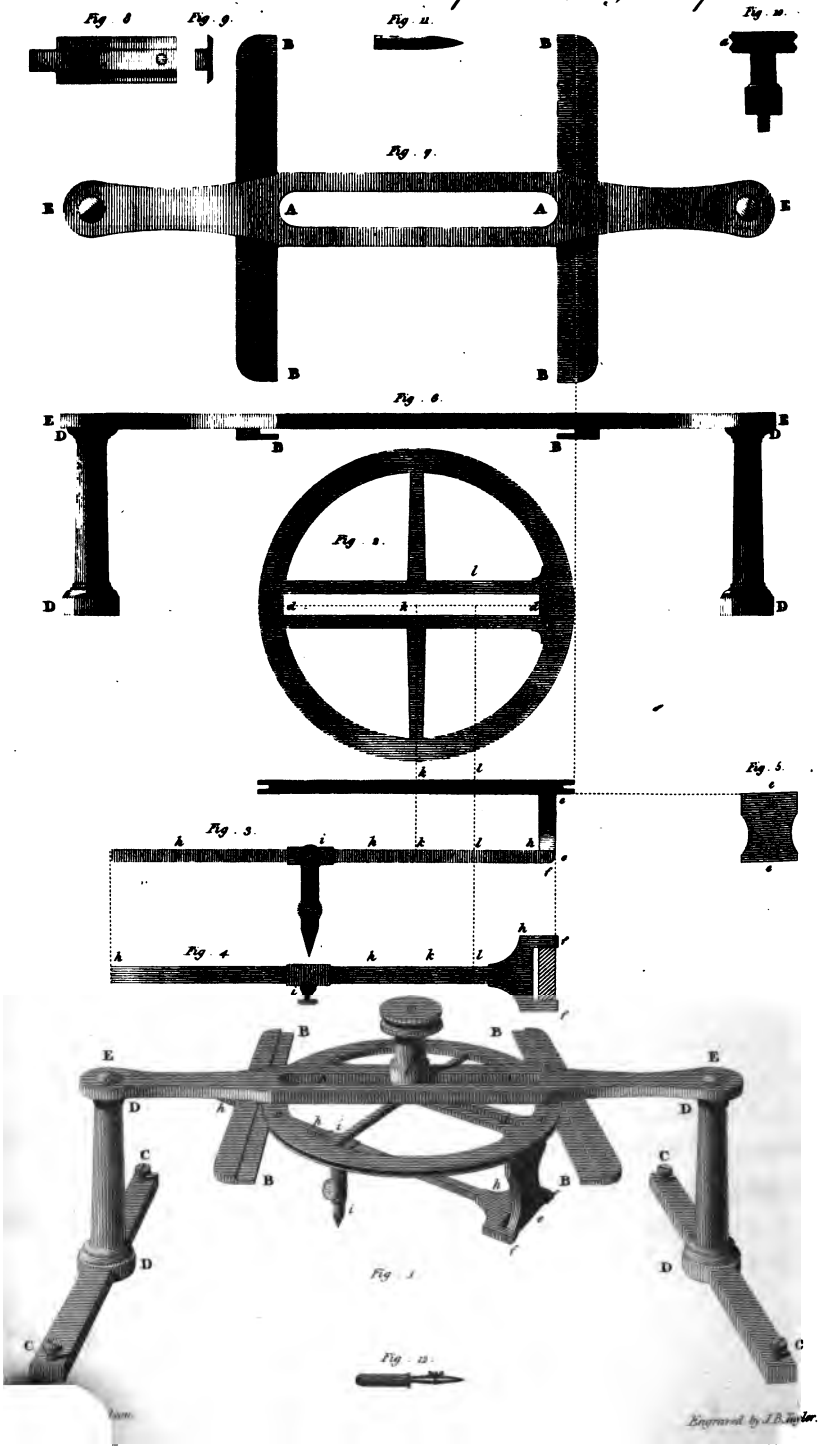
No. 27, Euston-place, Euston-square,
March 25th, 1816.

To C. TAYLOR, M.D. SEC.

The Method of preparing the Charcoal.

THE finest grained charcoal that can be procured is sawed into slips of the size and form required, and put into a pipkin

Mr. W.m Cubitt's Instrument for Drawing Ellipses.



kin of melted bees'-wax, where they are permitted to remain near a slow fire for half an hour or more, in proportion to the thickness of the charcoal; they are then taken out, and when perfectly cool, are fit for use. By adding a small quantity of rosin to the wax, they may be made considerably harder; and, on the contrary, should they be required softer, a little butter or tallow will answer the purpose. The advantages these pencils possess are, that they can be made at the most trifling expence, and at any time; and that drawings made with them are as permanent as ink, and not liable to injury by being rubbed, or remaining in the damp.

The above process will harden both red and black chalks, and make them permanent also.

The SILVER MEDAL *was this Session voted to Mr.* WILLIAM CUBITT, *of Ipswich, for an Instrument for Drawing Ellipses. The following Communication was received from him on the Subject, and one of the Instruments is preserved in the Society's Repository.*

DEAR SIR,

A PARTICULAR friend of mine, Mr. WM. CUBITT, of Ipswich, who has more than once distinguished himself by the excellence and simplicity of his contrivances, has sent a little instrument to me for the purpose of drawing circles and ellipses, or engraving them on copper, which he proposes to call an *Ellipsifex*, and at the same time requests me, (if I thought it worthy of notice) to forward it to the Society of

Arts, Manufactures and Commerce, who have at all times shown their forwardness to patronize any thing which might tend to improve or simplify the useful or Polite Arts. I am myself so much pleased with the simplicity of its construction, and the accuracy of its performance, that I do not hesitate to send it for the inspection of the Society. It will be seen that an ellipses can be drawn upon the paper with great facility, by merely making a right line in the first instance for the transverse axis, and laying the center of the instrument over this. If the center screw is placed in its greatest, or, indeed, any eccentricity, and the pencil immediately under it, the pencil, on turning the wheel, will be found to describe a right line. If, on the contrary, the center screw is placed in the center of the wheel, the pencil will describe a circle which may be diminished down to a point, without making any center mark, and hence the instrument is capable of describing every proportion of ellipse between the circle and the right line, and that to more extensive dimensions than any of the instruments I have yet seen. Such, however, as it is, I submit it to the judgment of the Society, and should they deem it deserving of their notice, I am sure Mr. Cubitt, the inventor, will feel himself much gratified.

Any communication addressed to me will be immediately attended to; and I am, dear Sir, with great respect,

Your's, very truly,

JOHN MILLINGTON.

Upper Mall, Hammersmith, 29th April, 1816.

To C. Taylor, M. D. Sec.

Referenc

Reference to the Engraving of Mr. WILLIAM CUBITT'S *Instrument for Drawing Ellipses. Plate* 8.

Fig. 1, Is a general view of the Instrument, consisting principally of a frame, wheel, and arm, for carrying the pencil, tracer, or pen. The whole being supposed to be placed upon a table or drawing-board, may be thus described, C C, C C, feet of the frame, which are placed in parallel lines longitudinally upon the table or drawing-board.

D D, D D, turned pillars of brass, firmly fixed to the feet C C, C C.

E E, a horizontal beam with a grove A A, fixed to the tops of the pillars D D.

B B, B B, guides, each consisting of a brass bar and a steel plate, attached to the horizontal beam E E; the straight edges B B, B B, of the steel plates being parallel to the feet C C, C C; or to the table; and at right angles to the longitudinal middle of the beam E E; *c c c*, a wheel, grooved on the edge, so as to fit and slide upon the steel plates B B, B B, and to move freely and exactly thereon, so that the centre of the wheel may be compelled to describe a straight line parallel to the table or drawing board, and at right angles to the longitudinal groove or slit A A, in the beam E E.

The arms of the wheel are placed at right angles to each other, and one of them is made double, so as to contain a groove *d d*, in which is inserted a slider, made to fit the groove exactly, and move freely therein.

a b, a handle, consisting of a milled head *a*, and turned pillar *b*, made to fit the slit or groove A A, in the beam E E; and having a screw at its end, which may be screwed into

the slider at pleasure, and make it fast in the groove *d d*, of the wheel.

e e, a vertical piece of brass, firmly attached to the under face or rim of the wheel, at one end of the groove *d d*.

ff, *h h h*, an arm jointed at *ff*, to the vertical piece *e e*, so as to move only in a vertical plane passing longitudinally along the middle of the groove *d d*, in the double arm of the wheel.

i i, a tube or case, to contain a pencil, pen, or tracer; made to slide along the arm *h h h*, and to be fixed by a milled headed screw; (which in this view, is hid by the rim of the wheel;) the tracer, when fitted in the tube, being of such a length, as when the point is resting on the paper, the arm may be parallel to the plane of the board; and the tracer, is fixed in the tube, by a small milled headed screw, shown at the lower end of the tube.

The parts of the perspective view of the Instrument being thus described; suppose then, the handle *a b*, is fixed in the center of the wheel; it is plain that when it is turned round with the wheel, the center will have an invariable position: but if it be fixed out of the center, it is evident, then, that the center will describe a straight line, parallel to, and equidistant from, the steel edges B B, B B, of the guides: and because the arm *h h h*, is in the same vertical plane with the groove *d d*, in the double arms of the wheel; and all the points in the longitudinal direction of the arm, fixed with respect to those which pass longitudinally along the said groove; there is therefore a certain point *k*, in the arm, *h h h*, in the same vertical line with the center of the wheel; and since the center of the wheel is always in a straight line parallel to the board or table, and at right angles to the beam E E; the said point *k*, in the arm will also

also be in a straight line, parallel to the board or table, and in a vertical plane passing through the line described by the center of the wheel; and because the axis of the handle *a b*, is likewise in the line which passes longitudinally along the groove *d d*, included by the arms of the wheel, there will be two points in this longitudinal line passing along the groove of the wheel; the one which is in the axis of the handle *a b*, moving along the middle of the groove A A, of the cross beam E E; and the other, which is the center of the wheel, moving at right angles therewith, parallel to the board; and, consequently, the arm *h h h*, will also have two such points, moving horizontally; the one which passes through the handle *a b*, in a vertical plane passing along the middle of the groove A A in the beam E E; and the other, in a vertical plane, passing through the line *d d*, described by the center of the wheel; and as the horizontal section of these two vertical planes, are two horizontal straight lines, at right angles to each other; the one point of the arm *h h h*, will move in the one line, and the other point in the other line.

It is therefore evident, when the axis of the handle *a b*, and the center of the wheel are coincident, that every point in the arm *h h h*, must describe the circumference of a circle; but when these two points are separated, every point in the arm *h h h* will describe an ellipsis.

Fig. 2, the face of the wheel; *d d*, the middle of the groove, referred to in the general view.

Fig. 3, profile or edge of the wheel, shewing its connection with the arm *h h h*. From this figure, the method of setting the instrument, in order to describe an ellipse of any given dimensions, will be shown; thus, let *k* be the point in the arm *h h h* corresponding to the center of the

wheel which is here a fixed point; make *k l* equal to the difference of the two semi axis; *l* will then be the center of the handle *a b*, which ought therefore to be screwed at that distance from the center of the wheel in the groove *d d*, and also make *k i* equal to the lesser semi axis; and the instrument will then be set, so as to describe the ellipse.

It is obvious, that as the arm *h h h*, has no interruption upon it, the point *i*, may be made to coincide with *k*, by which means, the tracer will describe a straight line, which may be in length, the double of *f k*. In using the instrument, the milled head of the handle should be twisted round with the thumb and fingers, at the same time letting it obey the direction given to it, by sliding along the groove A A, in the beam E E, without impediment or hindrance.

N. B. In adjusting the instrument, the two grooves, namely the groove A A in the beam E E, and the groove *d d*, in the wheel, should be brought underneath each other, so as to be in one straight line; then move the handle *a b*, until its center shall be in the point *l*, fig. 2 & 3; when, its distance from the point *i*, in the arm *h h h*, will be equal to the semi-transverse diameter of the ellipse; and make the distance of the tracer, from the point *k*, equal to *i*, which will be equal to its semi-conjugate diameter.

Fig. 4, shews the top of the arm *h h h*, with the slider *i*, and the form of the joint at *f f*.

Fig. 5, the side of the vertical piece of brass, shewn at *e e*, fig. 1.

Fig, 6, the horizontal beam, with the two pillars D D; and the ends of the straight edges, or transverse pieces B B, along which the wheel slides.

The

W. & W. Wastis's New Parallel Rule.

Pl

Fig. 1.

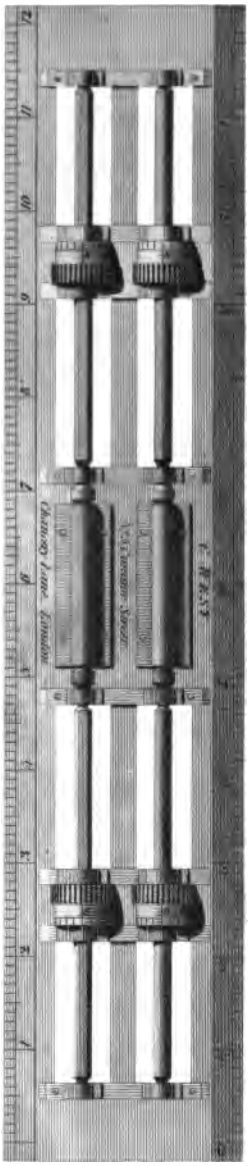


Fig. 2.

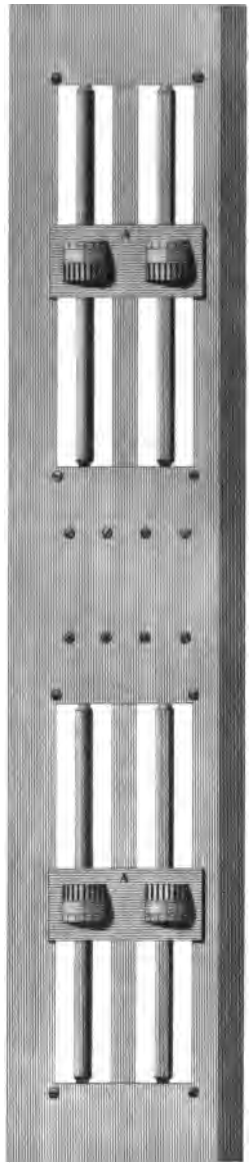


Fig. 3.

Fig. 5.

Fig. 4.

Engraved by J.B.Taylor

The steel plates shewn at *B B*, keep the wheel always in the plane of its face.

Fig. 7, shews the cross beam E E, with its groove A A; and the two transverse pieces B, B, in their real proportions: see its connection in the general view, fig. 1.

Figs. 8 and 9, the slider, with a female screw to receive the screwed end of the handle *a b*, its longitudinal direction is shown at figure 8, and its section at figure 9; when the end farthest from the handle is made to touch the rim of the wheel, the handle will be in the center of the wheel.

Fig. 10, the handle for turning the instrument by, consisting of a pillar *b*, with a screwed end, and a milled head, *a*; shewn in the general view fig. 1, at *a b*.

Fig. 11, the tracer or steel point, which will be useful upon copper.

Fig. 12, the drawing pen, for describing the elliptic curve with ink.

The SILVER ISIS MEDAL, *was this Session voted to Mr.* CHARLES WEST, *of Cursitor Street, Chancery Lane, for a Parallel Rule. The following Communication was received from him, and one of the Rules is preserved in the Society's Repository.*

SIR,

I AM anxious to submit to the Society an improved Parallel Rule, with double rollers, which may be shifted at pleasure, so as to make one rule answer the purpose of the three

three commonly used: should this alteration be approved by the Society, I shall feel myself much flattered by any mark of their sanction.

I am, Sir,

Your obedient humble servant,

CHARLES WEST.

Curtitor Street, Chancery Lane, April 15, 1816.

To C. TAYLOR, M.D. SEC.

Reference to the Engraving of Mr. C. West's new Parallel Rule. Plate 9.

Fig. 1, shews the top of the rule.

Fig. 2, the underside of the same. The double rollers placed in the parts A A, are considered to be of considerable advantage in the movement of the rule, so as to make it perform with more facility: A, A, sliders, in order to place the rollers at a greater or less distance from each other; as, by the greater distance, the movement of the rule is more to be depended upon; but when it is required, for want of room, as at the corner of a table, or drawing-board, for instance, to shorten the distance between them; the sliders will be found necessary, in order to accommodate the rule to such a situation.

Fig. 3, a longitudinal section, through the spindles.

Fig. 4, a transverse section through the rollers.

Fig. 5, a transverse section through the pivots.

The

Improved Drawing Board & T Square.

Fig. 1.

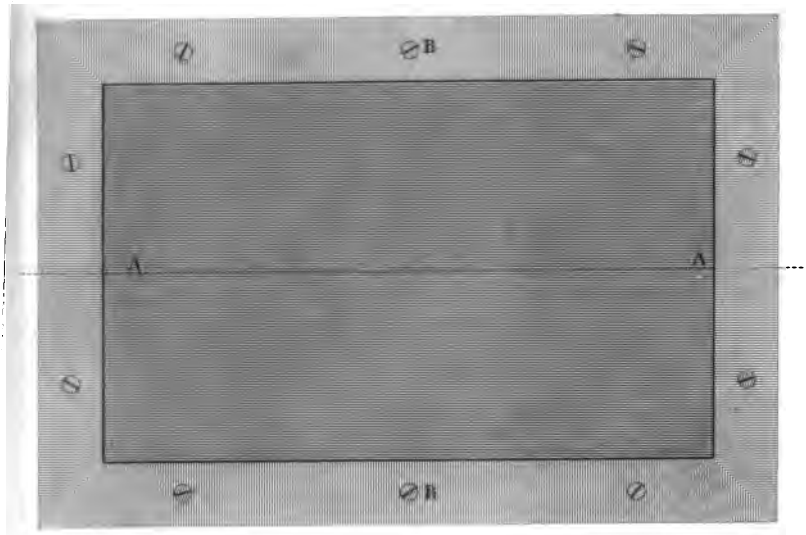


Fig. 2.

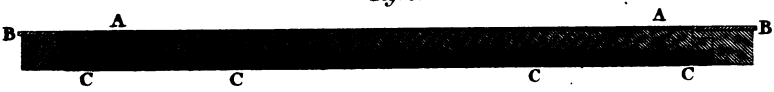


Fig. 3.

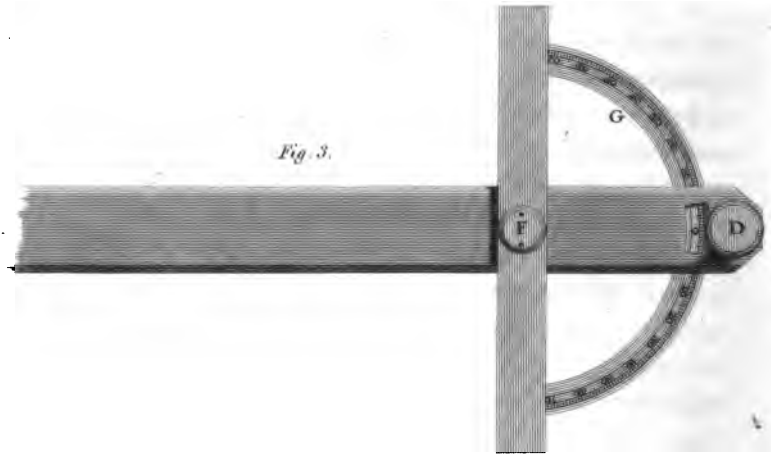


Fig. 4.

The SILVER MEDAL *and* FIVE GUINEAS, *were this Session voted to Mr.* EDMUND TURREL, *of Gee Street, Clarendon Square, for a Drawing Board and T square. The following Communication was received from him on the Subject, and one of the Boards and T squares, are preserved in the Society's Repository.*

SIR,

THE invention of Ruling Machines in the art of Copper Plate Engraving, produced such a degree of perfection in the tints ruled by them, that a corresponding degree of accuracy, was immediately required in all the other departments of the art, wherever the use of the machine was introduced.

But unfortunately for the credit of this department of the art, a most general opinion was directly formed, that engraving done with a machine required but little exertion in the artist to attain perfection, and that nearly the whole secret lay in the possession of a Ruling Machine:—Experience has most indubitally proved, that in general practice, the invention of a Ruling Machine, at the same time that it produced a portion of perfection in the tints ruled by it, never before seen, presented a degree of difficulty in the drawing and finishing department, such as had never been experienced. Indeed, such an excess of difficulty as might have prevented its adoption in the hands of any other person than that of its most ingenious inventor.

One

One of the most formidable difficulties which presents itself to an engraver of machinery and scientific subjects, is that of getting a correct outline tracing upon the copper plate. To effect this, transparent oiled paper (commonly called Tracing Paper), is used, for subjects of the free picturesque kind. But in plans, elevations, and sections of buildings, machinery, &c., such means are of little or no use; because, when such tracings are passed through the rolling press to transmit the outline to the copper plate, its unequal expansion while under the process of wetting, and likewise in its passage through the press produces, such a degree of error (especially when the Ruling Machine is to be employed) as to render such tracing completely useless.

To obviate this evil, the engraver has no other resource than to make a very correct outline reversed from his original drawing upon thin bank post paper, and having smeared the back with red chalk, carefully trace over each line, when the outline is laid down upon the varnished copper-plate.

I trust that it will appear evident from what has been said, that much will depend upon the nicety of the outline thus made, and as a means of ensuring accuracy of form, and delicacy of execution, I have found it necessary to improve the drawing boards for such purpose.

Whenever very thin paper is used for making outlines upon (and which is absolutely requisite in the case I have alluded to) considerable difficulty is found by the surface of the board giving way, wherever compasses are used for taking dimensions; but more particularly in all cases where a number of concentric circles are to be described from the same point, the large holes produced in the drawing rendering

dering it very unsightly, at the same time that all accuracy is destroyed by the centre hole frequently shifting into a hollow produced by the grain of the wood.

To avoid errors of this kind, I some years ago had recourse to a drawing board, covered with a plate of copper, which answered tolerably well, but when a point was pricked through the paper, it was scarcely visible, owing to the colour of the copper, which being reddish, rendered the dot, or puncture, very indistinct, while the surface was likely to have a very unpleasant oxyde produced upon it, owing to the necessity of stretching the paper while in a wetted state.

The Drawing Board which I have the honour to present, is covered with a plate of rolled zinc, which may be had of almost any dimensions, at Mr. Knight's, in Foster Lane, Cheapside.

As I have made use of Drawing Boards of this kind for nearly two years, I can speak with confidence of their advantages, and I can assure the Society, that to those artists who may be inclined to sacrifice a small additional expence, to obtain the means of making their drawings with neatness and accuracy, that they will not be disappointed if they possess a board of this description.

The advantages of zinc for this purpose I have found to be, that it is soft enough to admit of the insertion of a point sufficiently deep to be plainly seen, and yet hard enough to prevent the point from going to any considerable depth, so as to permit large holes to be made in the paper, and the drawing being complete, whatever holes are made in the zinc, may be burnished down by rubbing the thumb nail over them, which will sufficiently close them.

When oxydation of the metal takes place, it should be suffered

suffered to remain, because being white, it helps to render the thin paper opaque, and consequently the lines drawn upon it, will be the more plainly seen.

When the sides of the frame of a drawing board are straight lines and nicely perpendicular to each other, parallel and perpendicular lines may be very correctly drawn with a good T square, but as wood is continually warping with every change of weather, accuracy cannot be expected from such imperfect means.

To prevent any error arising from this circumstance, I screw a solid rim of brass upon the upper surface of my frame, permitting it to project a small distance beyond the outer edges of the wooden frame, so that the stock of T square may slide against either edge. This brass rim being dressed very true and at right angles, will remain so for any length of time, as nothing but extraordinary violence can injure it.

I can assure the Society, that the present invention has sprung from necessity, originating in the very minute size of the engravings of the present day, added to which, a degree of accuracy is required, that can only be attained by a corresponding improvement in the apparatus, and for effecting such purposes. The zinc plate may be applied to a common drawing board, and the brass rim to the frame, therefore those persons who possess a set of drawing boards, may have them improved at a small expence. To enable the Society to appreciate the value of this improvement, I have inclosed some outlines which have been made for tracing upon copper plates, by a pupil, conceiving that occular demonstration will have more effect in explaining its utility than a more elaborately written description.

The same objection that applies to the frame of a drawing

ing board, applies equally to a T square made with a wooden blade and fixed immovably to its stock, for if ever any injury happens to the fiducial or drawing edges, by a blow causing an indention, or by the wood warping through a change of weather, it must remain, because the blade being glued fast to the stock, does not admit of being corrected without considerable difficulty.

The square which I have the honour to present, is so constructed as to permit the blade to be withdrawn from the stock, for the purpose of correction, should any accident occur to it, and the same means which permit the blade to be removed for the purpose of correction and adjustment, enables the draughtsman to use it as a bevil at any angle, where it may be fixed by a clamp and thumb screw.

Should objection be formed to the weight of this invention, I beg leave to state that the same may be made in ebony or box wood, which would render it as light as a common square. The blade may be very easily set to a right angle by making it coincide with a line drawn on the arc for that purpose, where it may be fixed by the clamp.

Should any doubt arise as to the use of this improvement, I shall be happy to attend a Committee of the Society, to explain the difficulties that have given birth to it.

I am Sir,

Your most obedient servant,

EDMUND TURRELL.

No. 11, *Gee Street, Clarendon Square.*

To C. Taylor, M.D. Sec.

Reference

Reference to the Engraving of Mr. Turrell's Drawing Board and T Square. Plate 10.

Fig. 1, represents a plan of the Drawing Board and frame. The surface A A, shews the zinc plate, fastened round its edge with small copper pins, the heads of which are sunk and made smooth with the zinc surface. B B, represent the brass rim, made in one piece and screwed to the wooden frame of the Drawing Board by counter-sunk screws. The edges of this brass rim should be finished and set at right angles after it is screwed down to the frame.

Fig. 2, shews a section of fig. 1, taken through the line A A. In this figure it may be seen that the upper surfaces of the brass and zinc are so fitted as to be in the same plane. The small buttons C C C C, being formed like small wedges may be pressed into the grooves made in the frame to receive them. These, as a mode of fastening the board to the frame, will be found preferable to the wedges in common use, as they may be applied to a greater number of points, which will be found requisite when the board is large.

Fig. 3, shews a view of a T square with an adjusting blade, consequently it can be set to any angle and fixed to the arc G, by the thumb screw D.

Fig. 4, represents a section of fig. 3, in which the action of the thumb screw D, and the clamp E, may be more distinctly seen, as likewise the screw F, upon which the blade turns as a centre.

The screw F being withdrawn, permits the blade to be taken out, and the edges repaired, if they should receive any injury from wear or accident. The arc G, being divided into degrees, permits the blade to be placed at any angle where it may be fixed by the thumb-screw D.

The

W.m Mason's Perspectograph.

Fig. 6

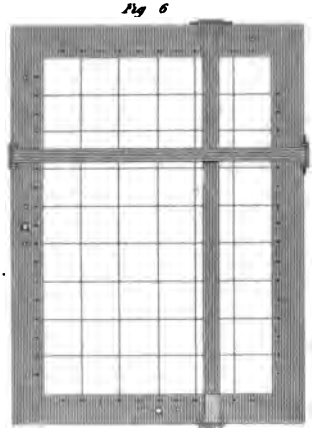


Fig. 5.

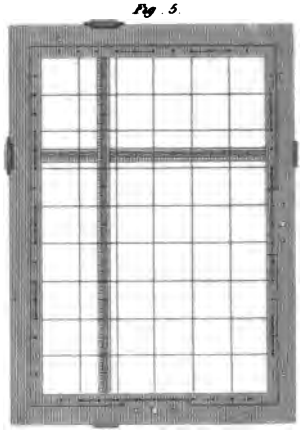


Fig. 4.

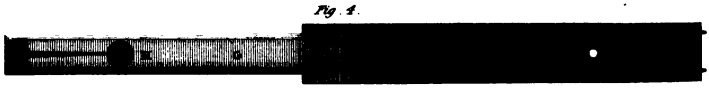


Fig. 3.

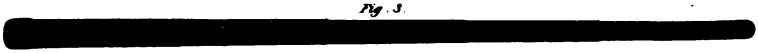


Fig. 2.

Fig. 1.

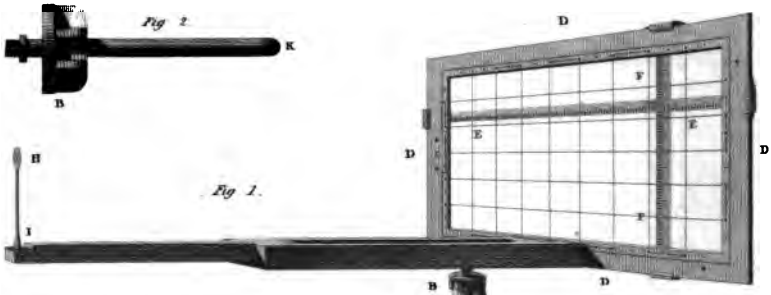
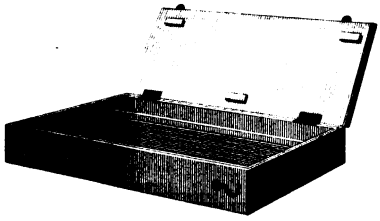


Fig. 8.

Fig. 7.



Drawn by M.A. Nicholson.

Engraved by J.B. Taylor.

The SILVER MEDAL, *was this Session voted to Mr.* THOMAS ALLASON, *of Westbourne Green, Paddington, for a Graphic Instrument. The following Communications were received from him, and one of the Instruments is preserved in the Society's Repository.*

SIR,

I BEG leave to communicate to the Society of Arts, &c., an invention of mine, which I consider may materially benefit and advance a knowledge of the Fine Arts in this country—"An Instrument for the correct and expeditious delineation of every description of objects." The want of an Instrument of this kind is universally felt and acknowledged; many attempts have been made, and contrivances of great merit have resulted from the attention given to this important subject. In fact, we have numberless optical and mathematical instruments for this purpose, but the whole of them I conceive liable to many objections; of the former, the most in use are the common camera obscura, Wollaston's camera lucida, with its application to the telescope by Varley;—of the latter, there is a more considerable number, such as Maltrus, Ferguson's, Turrell's, &c., with others of great ingenuity, in the possession of private individuals.

To the first I principally object either from the want of portability, simplicity, &c.; and what perhaps may not constitute the least object, their great expense; to the second I attach nearly the same objections, in addition to which their only ascertaining one point at an operation

entirely precludes their being used, except by persons of considerable leisure.

The Instrument I have the honour of submitting for the consideration of the Society will be perhaps better understood from the accompanying model and drawing than from any description I could offer. I shall therefore confine myself to a general description. It principally consists of a metal frame, 9 inches by 6, having two graduated scales moving upon its surface, the one vertical to the other, for the purpose of finding both the horizontal distances, with the height and proportions of the different objects to be drawn to the lower surface; and at right angles with the frames is attached a small beam with a sight point at the other extremity, which can be lengthened or shortened agreeably to the quantity of objects desirable to be introduced in the drawing, and the whole supported by a triangle, forming a walking-stick.

I have enclosed two letters received from gentlemen of great professional reputation, and shall be most happy to attend, should the Society require additional information.

I remain, Sir,

Your most obedient humble Servant,

THOMAS ALLASON.

Westbourne Green, March 20, 1816.

To C. TAYLOR, M. D. SEC.

DEAR SIR,

THE instrument which you have submitted for my opinion, is better adapted for taking perspective views from nature, than any that I am acquainted with. The scales which

which you have introduced are admirably well calculated for taking any succession of points in the horizontal plane, or in a vertical line, by only moving one of the scales: this is a property, that neither Ferguson's, nor the late Instrument invented by Mr. Turrell can reach; as with them all points are equally difficult, but with yours all those situated in the same straight line are very readily ascertained; and even in the change from one line to the other at right angles, it is equally easy with theirs.

I am, dear Sir,

Yours sincerely,

PETER NICHOLSON.

Oxford Street, 18th March, 1816.

To Mr. C. ALLASON, &c.

DEAR SIR,

I CANNOT recollect having seen either a drawing or description of an Instrument exactly like yours, though it is probable the idea *may* have occurred before to some one.

It appears to me likely to answer more generally than any of the instruments in common use, and it is peculiarly well adapted to the purposes of travellers.

If I had a drawing to make of any very complicated object, I certainly would make trial of it.

Wishing you success, I remain,

Dear Sir, yours sincerely,

WILSON LOWRY.

Tichfield Street, 19th March, 1816.

To Mr. C. ALLASON, &c.

Reference to the Engraving of Mr. ALLASON'S *Perspectograph. Plate* 11.

Fig. 1 is a general view of the instrument: A, A, A, B, a three-legged staff, for supporting the whole: A, A, A, the legs, jointed at B: C, a square horizontal trunk, with a brass socket in the bottom of it, by which it is screwed to the legs: D, D, D, D, a vertical brass frame screwed upon the end of the trunk, and pierced round the inner edges for the threads, which form the reticulated aperture, to pass through; the aperture being six by nine inches, and the horizontal threads being five in number, and the vertical ones eight, divide the whole aperture into 54 square inches: E, E, a thin slip of brass, bent at the ends, so as to slide freely on the outer edges of the brass frame, in order to be set parallel to the inner horizontal edges of it, at any distance from either edge: F, F, another vertical thin slip of brass, made to slide on the outer horizontal edges of the brass frame, in the same manner; the slip *e*, *e*, is divided into nine equal parts or inches; and *f*, *f*, into six inches; and each inch is subdivided into twelve parts, for the greater accuracy in taking the different bearings and amplitudes of objects: G, a slider made to fit the hollow of the trunk C, and to slide freely therein: H, the eye-piece, hinged to G at I, and which, when required, may be folded down so as to be entirely even with the upper surface of G, and the slider G, may be shut into the trunk C, or drawn out at pleasure, so that when the eye-piece H, is perpendicular to the horizon, it may be regulated so as to give the size desired to the drawing.

Fig. 2, the brass socket shown at B, fig. 1, for receiving the

the upper ends of the sectoral parts of the three-legged staff, and thereby forming the joints: KL, is a cylindric pin passing through the center of the brass piece B, which forms the sockets, having a male screw at the end L, which is received by the screw of the socket in the bottom of the trunk C. This cylindric piece K, is so fitted into the hole passing through B, as to allow the socket-piece B, to be turned round stiffly, so that the frame may be turned towards any object without risk of altering its position.

Fig. 3, the staff, shown as put together, and which is kept so by a cap at each end, and rings in the middle of it.

Fig. 4, a view of the upper side of the trunk C, the slider G, and the eye-piece H. In this geometrical representation, the slider is drawn almost its whole length out of the groove which is made to receive it; and the eye-piece is folded down into the cavity on the upper side of the slider.

Fig. 5, is the front part of the frame.

Fig. 6, the back part of the same.

Fig. 7, a view of the box which contains the whole of the apparatus, except the three-legged staff; and the sketch book is also contained in the center of the box, so that the whole is rendered portable, and easy of carriage.

Fig. 8, is a screw-driver, for screwing the frame to the end of the horizontal trunk.

N. B. The stem *i*, is a tube, and the eye-piece *f f*, is fixed on a wire, which slides up and down within it to adjust it to the horizon.

The SILVER ISIS MEDAL *was this Session voted to Mr.* THOMAS BARBER, *of Princes-street, Soho, for an Angulometer. The following Communication was received from him, and a Model of the Instrument is preserved in the Society's Repository.*

SIR,

WITH this letter you will receive an instrument I have denominated an Angulometer, and which I take the liberty to beg of you to present to the Society of Arts, &c.

The principal uses for which it is intended are, the laying down and measuring of angles; and, as proportional compasses. It may also be used instead of triangular compasses, and the simple dividers. The grand object of the invention is to prevent the trouble and inconvenience of being obliged to produce the legs of angles of short radii to measure them, and of making the dots so much farther from the angular point in laying them down by the instruments now in use, than is wanted for the length of the sides.

How far I have succeeded, the Society will determine with their usual impartiality and acumen; should they think it worthy of their reward, I shall feel myself much honoured by the patronage of such able judges.

I am, Sir,
With great respect,
Your obedient humble Servant,
THOMAS BARBER.

No. 24, *Princes-Street, Soho.*

To C. TAYLOR, M. D. SEC.

Description

Mr. Tho.s Barber's Angulometer.

Fig. 1.

Fig. 7.

Fig. 8.

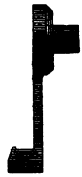


Fig. 9.

Fig. 6.

Fig. 12.

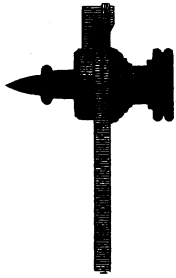


Fig. 10.

Fig. 2.

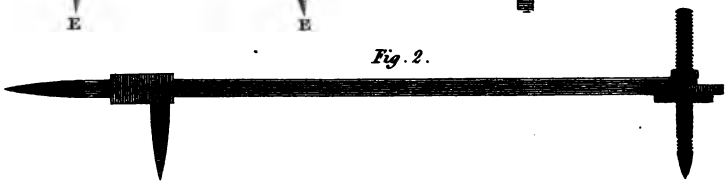


Fig. 3.

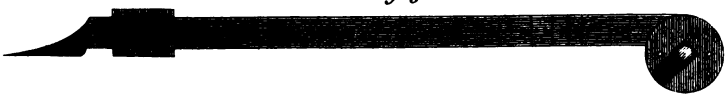


Fig. 11.

Fig. 4.

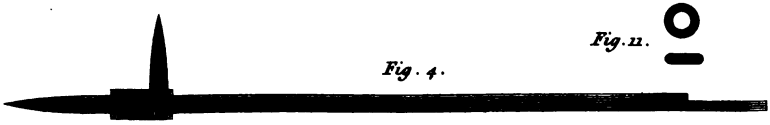
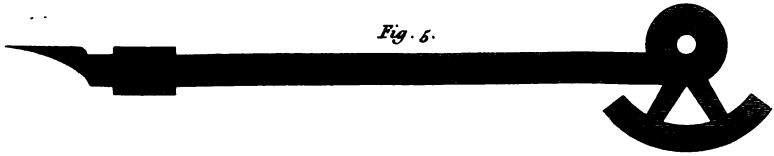


Fig. 5.



Description of the Angulometer.

THE Angulometer consists of two straight brass bars of any length, (those of the model are about five inches from the center of the joint), framed together by a single joint moving on a steel center similar to a common carpenter's rule, except that the external edges or sides form tangents to the circular cheeks or sides of the joint; the internal sides are made parallel to these and their bounding lines, if produced across the joint, would fall on the outside of the center, leaving the span of about 1-8th of an inch between them; this space is to allow for the thickness of two nonius sliders, which move the whole length of the bars, each carrying a steel point at right angles to the plane in which the bars move; these points are made like those of the common compasses, and of a length to the fancy of the user: at the end of each bar, and in the same plane, is fixed another steel point; the inner surfaces of both these pairs of points are close together, when the instrument is supposed to be closed. From the joint end of one of the bars springs an arc of a circle containing a little more than a quadrant, placed in such a manner as to allow of the slider passing close up to the joint; this circle, which is in the same plane with the broad surface of the joint, is divided into 90 degrees, and numbered with a double row of figures—the first row from 80 to 90 degrees off, and the second from 90 to 180. Its radius in the model is only one inch; but when great portability is not of such consequence, a radius of one and a half inches is better, for, the scale being more open, less care is necessary to avoid errors.

The leg to which this arc is attached, I shall, by way of

distinction, call the moveable leg; the other, which carries the nonius, the base. The center is turned with a flanch, from the bottom of which proceeds a point of the same length as those in the sliders, and is used as the angular point; the other end of the center after passing through the joint is filed square, and a collet fitted on it; about a fourth of an inch that remains about the collet is tapped, and the whole secured together by a milled head screwed down upon the collet; between this collet and the joint cheek of the base-bar, the moveable leg turns; the other is prevented from having any motion on the center by two steady pins passing through the flanch into the joint.

Upon this center point a nonius is fixed by a spring pipe, so as to have a stiff motion upon it as a center, and secured in its place by a small collet; the other end laps over the arcs in the usual way, and is divided so as to read to five minutes.

The arc being only 90 degrees, will of course measure no greater than a right angle; but when the instrument is wanted to measure a greater, it is only necessary to push the nonius back as far as it will go, and read by the second row of figures; it will then measure any angle that wants 5 of a semi-circle.

The nonius is prevented being pushed too far backward or forward by two pins fixed in the joint.

The divisions on the two bars are for dividing lines, in the same way as with proportional compasses.

To use the Angulometer.

To lay down an angle:—Hold the instrument in the left hand by the milled head; grasp the end of the base with the fingers

fingers of the right hand; and, with the thumb, push the slider to any part of the base required; set the slider on the moveable leg by the same way, and open the angulometer to the angle required; then place it on the paper, gently press on the points, and draw the lines at pleasure.

To measure an angle:—Place the sliders on both legs as before, so that the points will fall on any part of the sides of the proposed angle; then placing the angular point on the apex of the angle of the base slider, point on one line, and keep the other just clear of the paper, and with the finger and thumb press the instrument together till the moveable point will fall on the other side of the angle; and the nonius will show the number of degrees and minutes.

As proportional compasses:—Place the indices on the sliders to the required No. on each leg; and take the extent of the line to be divided between the end points, and the proportional part will be given by the distance between the two sliding points.

Reference to the Engraving of Mr. THOMAS BARBER'S *Angulometer. Plate* 12.

Fig. 1, a general view of the angulometer, which answers the purposes of a protractor, a three-legged compass, and also a proportional compass.

A, A, the legs, jointed at B: B the joint, with a projecting pin from the under side, shown at F: C, C, sliders, moveable at pleasure upon the legs A, A, to which are attached the projecting points D, D.

The extreme point F, of the pin, is in the line of the axis of the center pin of the joint.

The

The points E, E, the extremities of the legs A, A, and the points D, D, which project from the sliders, are all in a plane passing through the axis of the center-pin, when the instrument is shut; and, when open at any angle, the point F, and the points D, D, are in a plane perpendicular to the axis of the center pin, quadrant of the same piece of brass with one of the legs: H, the vernier, in order to divide the degrees into minutes.

Fig. 2, one of the legs of the instrument, shown on the edge, with the center-pin and point at the end of it.

Fig. 3, side of the same.

Fig. 4, edge of the other leg.

Fig. 5, edge of the other leg, with the quadrant.

Fig. 6, one of the sliders, shown separately.

Fig. 7, the vernier, shown on the face, with the hole through which the center-pin passes.

Fig. 8, the vernier, shown on the edge.

Fig. 9, the milled headed nut, which tightened the instrument shown on the edge.

Fig. 10, washer under the milled headed nut, shown on the edge and face.

Fig. 11, a milled headed nut, next to the point.

PAPERS

IN

MANUFACTURES.

The GOLD MEDAL, *adjudged in the Session* 1814-15, *to Mr.* BUCKE, *of Richmond, Surry, for the Production of Merino Wool, (Premium* 132,) *which had been withheld in consequence of a Claim made by Mr. Tharp, of Gloucester-street, Portman-sq. for a portion of the Society's Honours; being, at the time Mr.* BUCKE *claimed the Sheep, in partnership with him, was this Session delivered to Messrs.* THARP *and* BUCKE. *The following Communications were received from them on the Subject, and Specimens of the Wool and Cloth are preserved in the Society's Repository.*

SIR,

IN sending you this specimen of pure Merino wool, grown by me, from which the piece of cloth I send to be exhibited for the premium was manufactured, I must beg to state, that,

that, from unavoidable circumstances, this specimen is not so perfectly sound as I could have wished; but, having another specimen, which I shall be able to deliver to you in a short time, I hope I shall be allowed to present it to the Society.

I remain, Sir,

Your obedient Servant,

THOS. GEO. BUCKE.

Richmond, Surry, March 27th, 1815.

To C. TAYLOR, M. D. SEC.

I, THOMAS GEORGE BUCKE, of the parish of Richmond, do hereby certify, that the specimen of wool, herewith sent to the Society of Arts, is a fair sample of the pure Merino wool grown by me, from which the cloth manufactured by Mr. R. Whittington, and shown by me for the premium, was manufactured.

THOS. GEO. BUCKE.

Richmond, 27th March, 1815.

I DO hereby certify, that 600 pounds of pure Merino wool bought of THOMAS GEORGE BUCKE, Esq. by me, Richard Whittington, in the year 1814, was manufactured into superfine cloths, and the specimen marked "No. 19440—R.W. Merino," is a cloth made from the Rs. of the said wool.

RICHARD WHITTINGTON.

Monk Combe, near Bath, 24th Feb. 1815.

To C. TAYLOR, M. D. SEC.

DEAR SIR,

I HAVE enclosed you a Certificate, which I have obtained from the shepherd who lived with me at the time the wool

was

was sold to Mr. Whittington, and I have the honour to remain, Sir,

Your obedient Servant,

THOS. GEO. BUCKE.

Richmond, 5th May, 1815.

To C. TAYLOR, M. D. SEC.

I DO hereby certify, that the pure Merino wool, purchased by Mr. R. Whittington of Mr. Bucke, in 1814, was grown at Richmond, in the county of Surry.

Witness my mark,

WM. TUCKEL, his mark, ⋈,

Shepherd to the said Mr. Bucke.

SIR,

I HAVE received your letter, saying you received a Certificate, dated May 4, and Wm. Tuckel certainly signed the same, stating, that the pure Merino wool was purchased by Mr. R. Whittington of Mr. Bucke, and grown in Richmond, in the county of Surry, 1814, and produced from Mr. Bucke's sheep.

I remain, Sir,

Your humble Servant,

WILLIAM TUCKWELL,

Richmond, Surry, Gardener.

Richmond, May 8th, 1815.

TO C. TAYLOR, M. D. SEC.

SIR,

IN reply to your letter of the 6th, the Certificate that the wool, of which No. 19440 was manufactured, was fine Merino

rino wool, grown by Thomas George Bucke, Esq., of Richmond, is correct.

I am, Sir,

Your most obedient Servant,

R. W. WHITTINGTON.

Monk Combe, May 9th 1815.

To C. TAYLOR, M. D. SEC.

DEAR SIR,

I HOPE you will excuse the trouble I am about to give you in requesting that you will have the goodness to state to the Board for the Encouragement of Arts and Sciences, that the piece of cloth manufactured of the wool of the Kew concern, and which gained the premium last year, and was claimed by Mr. Bucke, is, in fact, due to me, as principal of the concern, and original founder of the flock. The part Mr. Bucke has acted in the whole business cannot entitle him to claim this honour, he having sold off all the sheep he possessed, and for which he now owes me a considerable sum, besides leaving the demands of the concern to be liquidated by me, who, notwithstanding the difficulties he has put me to, and the great depreciation of this valuable stock, only wish that which I consider due to me as an encouragement for my exertions in the cause under every disadvantage; whereas, if the medal was to be presented to Mr. B. he would neither merit or value it, but for its intrinsic worth, and it would in all probability be disposed of immediately. I therefore trust that this statement of the case will be sufficient to induce the Board to consider

me

me as justly entitled to the medal, which I shall be proud to receive. Believe me,

Dear Sir, yours truly,

JOHN THARP.

No. 3, Gloucester Street, Portman Square, 29th March, 1816.

To C. TAYLOR, M.D. SEC.

*** The Committee of *Manufacturers*, in consequence of Mr. Bucke's non-appearance on the day of distribution, May, 1815, when he ought to have been present for the purpose of receiving the medal, and Mr. Tharp's claim to a part of the Society's premium from the circumstance of his being in partnership with Mr. B. when he possessed the flock, investigated the business, and the claim being substantiated in all its bearings, judged it most equitable to present the medal to the parties conjointly.

The GOLD MEDAL *was this Session adjudged to Mr.* G. FLOWER, *of Marden, near Hertford, for the production of Merino Wool from the Breed of Spanish Sheep in England,* (*Premium* 132). *The following Communications were received on the Subject, and Specimens of the Wool and Cloth are preserved in the Society's Repository.*

SIR,

THIS letter accompanies a certificate from my bailiff, and a note from a neighbour, who is well acquainted with the notorious

notorious fact of my having a large Merino flock, and who has seen much of my cloth at different times since its manufacture. It is now too late to collect certificates from the manufacturers who have made and are making up my wool. They are Mr. Weddle, of Stroud; Mr. Evans, of Wotton Underedge; Mr. Phillips, of Melksham; Mr. F. Nash, of Twerton, near Bath. To Mr. Swain, Wool-stapler, of White Street, I sold a part in the fleece.

I say it will be too late, as I am going to leave the kingdom on or about the 10th of May.

If the premium can, consistently with the rules of the Society, be awarded to me (if I have a chance of obtaining it) before I depart, it would be gratifying.

I am, Sir,

Your very obedient servant,

G. FLOWER.

Marden, March, 16, 1816.

To C. TAYLOR, M. D. SEC.

CERTIFICATES.

I, Captain Stone, bailiff to Mr. Flower, do certify, that I have been in the habit of seeing, and tending upon the Merino flock, belonging to Mr. Flower, one part of which is in Hertfordshire, and the other part in Oxfordshire. That I have been in the habit of shearing many of them with my own hands; that I have assisted in packing up the wool for many, and directing the same to various persons, for the purpose of being manufactured.

I have frequently seen Mr. Flower's Merinos, and am well acquainted with the fact of his flocks being numerous, residing very near the ground on which two feed:—I have also, occasionally, some of them on my own farm to keep.

I have

I have also seen cloths of various colours manufactured from his wool.

WILLIAM WEBB,
Farmer at Irwin Hill, near Hertford.

DEAR SIR,

IN reply to your favour of the 3d instant, your cloths are in a state of progress, and we shall lose no time in completing the whole. Mr. Phillips, sen. understood from you when you last parted with him, that you could more readily dispose of the cloth if it was all dyed dark blue, which has consequently been done.

We annex you particulars of waste, &c. on the other side, but as all the pieces are not yet put out to the weaver, we cannot give you any accurate account of the number of yards it will produce. You may reckon generally, that 13lb. 1-4th. of dyed wool, will produce 1 yard of cloth.

We are, dear Sir,
Your most obedient servants,
EDWARD PHILLIPS & SONS.

Melksham, 5th Jan. 1816.

Mr. G. FLOWER, &c. &c.

P. S. The small bag of wool belonging to the farmer, we have done nothing with, as the expence of manufacturing it would be more than its value when finished, but we will scour it, and return it if you wish it.

The weight received - - -	3442lbs.
Weight when dyed and dried -	1357
	2085 waste,

which includes every species of waste, the 1357lbs. being neat wool. 3442lbs. of wool in grease is 516*l.* ; 770 yards of cloth, at 15*s.* per yd. - - - 577*l.* 10*s.*

Ditto at 13*s.* - - - - 500*l.* 10*s.*

This is to certify, that I Samuel Weddell, of Stroud, in the county of Gloucestershire, clothier, am the manufacturer of No. 100,922, a piece of superfine imperial Merino black cloth, the property of Mr. George Flower, and that the quantity of wool consumed in manufacturing, was 158lbs. full in grease, which wool I believe was grown by Mr. George Flower, of Marden, in the county of Herts.

SAMUEL WEDDELL.

Stroud, March 15, 1816.

Mr. R. FLOWER, &c.

DEAR SIR,

I received a letter from your good father yesterday, and he wished me to send the No. of pounds of wool I had received of yours up; which is this weight, 4029lb. including R. F. and K., which on your inspection you will find correct.

I remain, dear Sir,
Yours truly,

MARTIN EVANS.

Wotton Underedge, 6th May, 1816.

Mr. G. FLOWER, &c.

The

Mr. T. Scorrar's Improved Machine for Blocking Straw Hats.

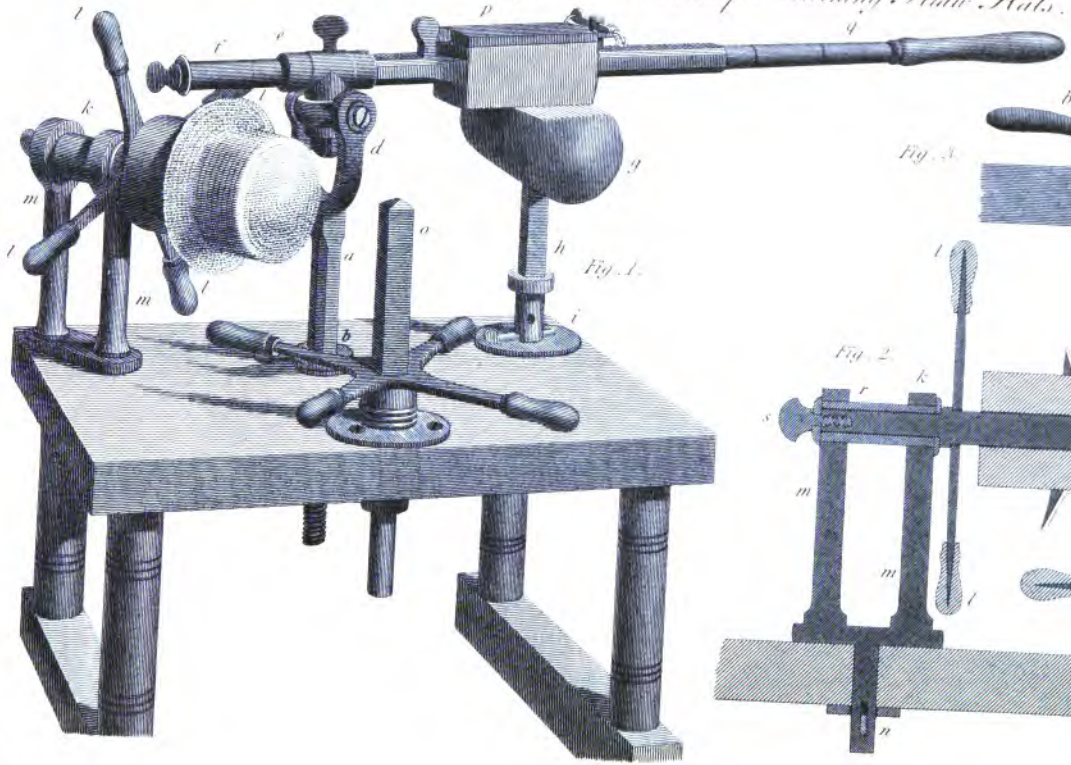


Fig. 1.

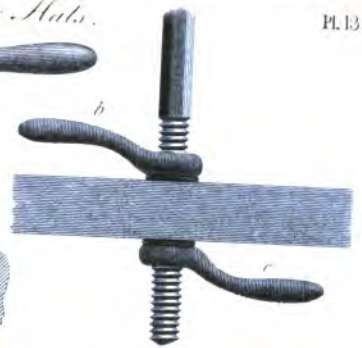


Fig. 3.

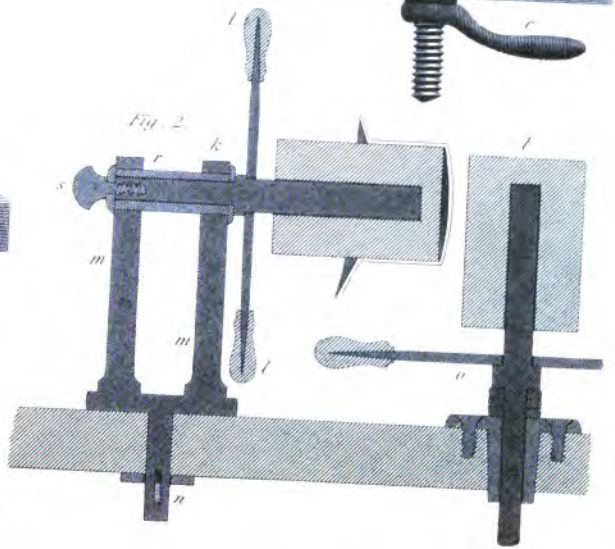


Fig. 2.

Drawn by C. Varley.

Engraved by G. Gladwin.

The SILVER ISIS MEDAL *was this Session voted to Mr.* THOMAS SCHORRAR, *of Green Street, Bennet's Row, Blackfriars, for his Improved Machine for Blocking Straw Hats. The following Communication was received from him on the Subject, and a Model of the Machine is preserved in the Society's Repository.*

SIR,

HAVING improved my machine for blocking Straw Hats, I should feel additionally honoured, if the Society for the Encouragement of Arts, &c. should, in its present state, consider it worthy any mark of their approbation.

I am, Sir,

Your most obedient Servant,

THOMAS SCHORRAR.

Green Street, Bennet's Row, April 18, 1816.

To C. TAYLOR, M. D. SEC.

I have enclosed a certificate, testifying its advantages, signed by three workmen who have used the machine.

GENTLEMEN,

This is to certify, that the improvements made upon the machine for blocking straw bonnets, by Thomas Schorrar, are as much to his praise, as the machine itself: having, now, three different motions, there is no necessity for changing the blocks, as we can finish a bonnet out and out, before it need be laid out of the hand; whereas,

before the machine was thus improved, (having only one motion) we were obliged to change blocks three different times, which caused unnecessary trouble to the blockers.

Signed T. SWINCOE, Stone's End, Borough.
Thos. MORGAN, Newington Causeway.
Thos. BUGS, Bishopsgate Street.

6th *April*, 1816.

To the Society for the Encouragement of Arts, &c.

Reference to Mr. Schorrar's Machine for blocking and smoothing Straw Hats.

Fig. 1. the machine ready for work.

a. A standard with a screw-stem passing through the table by which it is fixed to any required height by two counter-nuts *b*, and *c*, (fig. 3.) the standard is forked at *d*, to contain the universal joint *e*, the part of the lever *f*, slides and turns in the socket *e*; *g*, a long flat block, with a round end fixed on the spindle *h*; this may be turned by the block *g*, and elevated, if required, by a pin *i*; *k*, an horizontal spindle with four levers *l*, *l*, *l*, *l*, for turning it; this carries the block for smoothing the sides; the frame *m*, *m*, (in which the spindle *k* turns) revolves on an axis *n*, shown in the section fig. 2, *o*; a third spindle moved by four levers, this receives the block from the spindle *k*, to smooth on the top of the hats; these three spindles are square at the top for receiving the blocks from each other, and are placed at equal distances from the standard, so that the box-iron *p*, may be turned by the lever *q*, *f*, to either of them; *r*, fig. 2, is

2, is a bell-metal socket, in which the spindle *k*, turns; *s*, a screw and collet to keep it in its place, the block is shown on both spindles to render visible, their side and tap being of an height suitable to the iron.

The box-iron *p*, is faced with polished steel.

The THANKS *of the Society were this Session voted to* SAMUEL HOOD, *Esq. Inspector of Canvas for his Majesty's Navy, Deptford, for Specimens of Sail Canvas. The following Communications were received from him, and Specimens of the Canvas are preserved in the Society's Repository.*

DEAR SIR,

CONCEIVING that it might be very acceptable, and serviceable that you should have specimens of Sail canvas used in his Majesty's Navy during the last forty years, including the war with America, and the two last wars, in which time great improvements have been effected, by which the navy and the country must have been very considerably benefitted, I beg to request your opinion thereupon, and to say, that I should (if it should be deemed desirable) furnish the Society of Arts, &c. with fair samples of the canvas employed during the American, the two last wars, and such as the navy has at present in store.

I feel a confidence that a comparison thus shewn, must be productive of much real advantage to the nation, very many persons deeply interested in shipping being unaware of the

extreme difference in the quality, and of the great additional risk they subject both property and lives to, by neglecting to purchase good canvas, which will ever be found to be the cheapest.

With great respect,
I am, Sir,
Your most obedient Servant,

SAMUEL HOOD.

Brunswick Terrace, Deptford, Feb. 1, 1816.

To C. TAYLOR, M.D. SEC.

SIR,

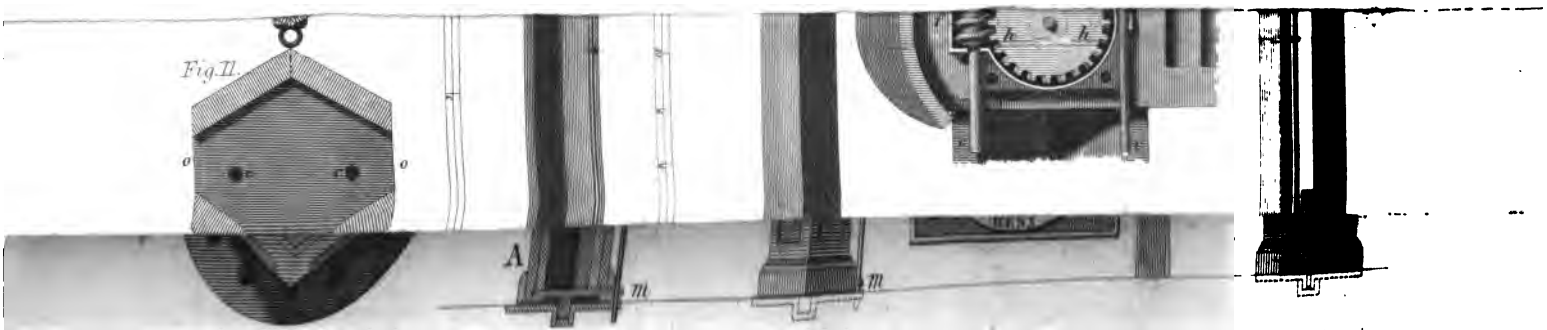
WILL you be pleased to signify what quantity of each sort of canvas will be necessary to answer the purpose of the Society. Would a few yards of each sort be sufficient, or would it be better to send a bolt (40 yards) of each? The favour of your reply will oblige, Sir,

Your most obedient servant,

SAMUEL HOOD.

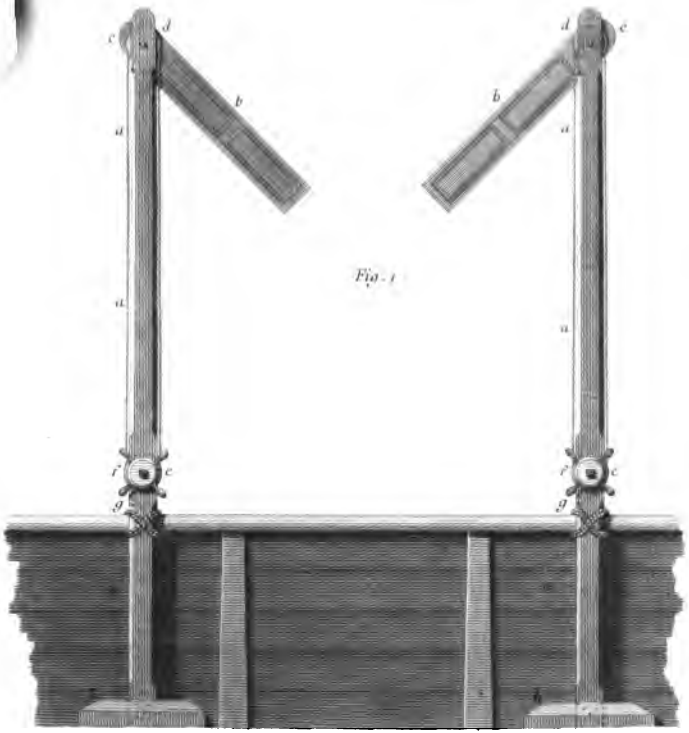
Brunswick Terrace, Deptford, April 30, 1816.

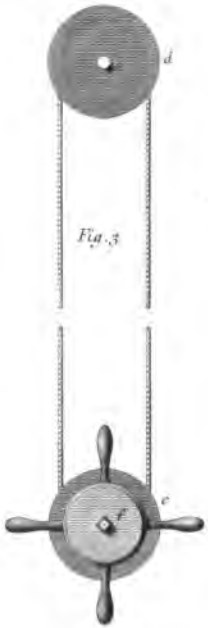
To C. TAYLOR, M.D SEC.

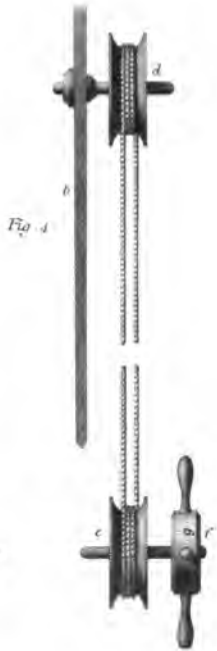


Drawn by J. Clement.

Engraved by J. Davis.







Drawn by J. Clement

Engraved by J. Davies

PAPERS

IN

MECHANICS.

The GOLD MEDAL *of the Society was this Session voted to Admiral* SIR HOME POPHAM, *of Greenwich, for his Telegraph, and Marine Vocabulary. The following Communications were received from him. A Model of the Telegraph, and a Copy of the Vocabulary are preserved in the Society's Repository.*

SIR HOME POPHAM presents his compliments to DOCTOR TAYLOR, and as he observes that in the register for premiums distributed by the Society of Arts, &c. that medals have been given for various modes of communication, he takes the liberty of requesting DR. TAYLOR to submit to the Society, first, his Marine Vocabulary, or Telegraphic Signals; then, his Telegraph with its explanation, and having only two arms, is capable of making two hundred and twenty thousand signals.

There are other points of this system, which SIR HOME

will be very happy to explain personally to the Society, but which, for obvious reasons, he cannot well transmit.

Greenwich, 27th February, 1816.

To C. TAYLOR, M. D. SEC.

SIR,

I BEG you will do me the honour of laying before the Society of Arts, &c. the Sea Telegraph which I have lately invented, and just now completed, to the best of my judgment.

This forms the sixth part of the general system of flags and signals for universal communication, viz. 1st, New system of flags, and method of combining them: 2dly, Marine Vocabulary: 3dly, Code of Admiralty signals, not presented to the Society: 4thly, New semaphore, or telegraph for communicating by land: 5thly, New method of cutting buntin, and making flags: and 6thly, Sea Telegraph for general communication, and which I hope will be found of universal benefit to the commercial interests of Great Britain, and to many purposes of *convenience* and *humanity*, by its facility of communication.

I am, Sir,

Your most obedient humble Servant,

HOME POPHAM.

Greenwich, 26th March, 1816.

To C. TAYLOR, M. D. SEC.

Marine Vocabulary and Telegraph, particularly adapted to the Commerce of Great Britain.

IT has long been considered desirable that a system of general communication at sea should be established for the merchant

merchant ships of this country; but the first cost of a set of flags, and the annual wear and tear, presented a very strong objection to such an establishment, except in the East-India Company's service. This difficulty is now removed, by the application of a sea telegraph, which will not in the first instance cost more than fifty shillings; and its wear and tear will not be five shillings a year.

This telegraph applied to the Commercial Marine Vocabulary, will afford the greatest facility of communication to merchant ships, and furnish them with the means of establishing every description of commercial intercourse and correspondence; and of concentrating in the metropolis the most general information from every part of the world. The nature and state of all the foreign markets may be ascertained by the reciprocal communication of ships when crossing each other at sea. Each merchant will know the exact situation of his ship, and will receive intelligence of the state of the markets at the last place she sailed from; the time she is likely to arrive at her middle port; and when she may probably be expected at her home destination. All the wants of a ship may be communicated, when a corresponding telegraph is established, before it could be practicable for a master to get on shore; by which means much time would be saved in the general refitment of a ship.

These advantages apply principally to the commercial interests; but there are other considerations, particularly of *humanity*, which grow out of this system; and, by a regular and well-applied communication from the shore, in cases where shipwrecks cannot be avoided; by which the lives of many individuals may be saved, and their exertions insured for the protection and security of the property committed to their charge.

The

The vocabulary may be also used as a cypher with a secret key; by which means those who possess it will be able to carry on, in a secret manner, a correspondence with their respective ships.

HOME POPHAM.

Reference to the Engraving of SIR HOME POPHAM'S *Telegraph. Plate* 14.

THE telegraph is composed of a lofty hexangular framing of timber, supported upon a pivot below, and capable of turning, in a collar in the roof of the cabin, to any direction required: from the upper part of this frame, two arms, each turning upon an axis, can be projected, and retained at any angle by means of the machinery included in it.

Fig. 1, is an external front view of the telegraph, showing the two winches or handles, which communicate motion to the arms, as well as to the two indices, which point out upon the dial-plates, to the persons working the telegraph in the cabin, the situations of the arms above.

Fig. 2, is a side view of the telegraph.

Fig. 3, is a vertical section of the telegraph, in the same position as fig. 1, showing the situation of the wheel-work by which it is actuated; but, as these parts are necessarily too minute to be readily understood, they are delineated on an enlarged scale, in figs. 4, 5 and 6; in which *a*, *a*, are two bevil wheels on the same axis with the handles; these communicate motion to two others, at right angles to them, *b*, *b*, which give motion to two vertical rods *c*, *c*, passing up through guides in the shaft of the telegraph, and which have

two

two endless screws upon each of them, viz. two below, *d*, *d*, working into two endless screw-wheels *e*, *e*, upon the arbors of the indices, and two above *f*, *f*, working into two endless screw-wheels, *g*, *g*, attached to the arms of the telegraph, and which thus give similar movements to the indices and arms. All the endless screw-wheels have a similar number of teeth in them. The upper endless screw-wheels have sockets, upon which the arms are fitted, and are turned round with the wheels, by means of two studs, which project from their faces, and enter into holes made in the arms.

Fig. 7, represents, on the same enlarged scale, the endless screw *f*, and wheel *g*, attached to a part of the arm of the telegraph by the studs *h*, *h*, and also the two rods *c*, *c*, one of which terminates at the endless screw *f*; whilst the other passes up through a guide to the upper arm of the telegraph.

Fig. 8, is an horizontal section at E, fig. 3, also on an enlarged scale, showing the external appearance of the iron case which covers the endless screw and wheel *h*, *h*, having two studs fixed upon it, which enter into the lower arm of the telegraph.

Fig. 9, is an horizontal section on the same scale, through the base of the telegraph at A, fig. 3: *i*, is a circular plate of cast iron, made fast to the floor of the cabin, in the center of which is a step, or cavity, *k*, in which the pivot of the telegraph acts; and round it are holes, into which the bolt, *l*, can be let fall to secure the telegraph in any required position: the bolt, *l*, also passes through two loops, *m*, *m*, figs. 1, 2, and 3, in the shaft of the telegraph to steady it; but can be occasionally taken out, and thrust horizontally into the hole, *n*, fig. 3, so as to act as a lever to turn the telegraph round.

Fig.

Fig. 10 is an horizontal section, likewise on the same enlarged scale, through the shaft of the telegraph at C, fig. 3: *c*, *c*, the two rods, passing to the two endless screws.

Fig. 11 is another horizontal section through the shaft at D, fig. 3, in which are shown the two openings at the sides, *o*, *o*, to let the arm of the telegraph pass.

Fig. 12 is a similar section at F, fig. 3.

Fig. 13 is an horizontal view of the top of the telegraph at G, fig. 3; *h*, *h*, the two studs, which enter the upper arm.

Fig. 14 is a representation of the two dial plates, on a still larger scale, to show the divisions thereon.

On the outside of the shaft of the telegraph two rows of wooden blocks, not shown in the engraving, are fixed alternately, to serve as steps; by which, and with the assistance of a rope suspended from the top, a person may occasionally ascend it to apply oil to the machinery within it.

Reference to the Engraving of SIR HOME POPHAM'S *Sea Telegraph. Plate* 15.

Fig. 1 is a representation of the two machines which form the sea telegraph, lashed to the side of a ship, as in use; the lower ends of the parts being stopped into blocks secured to the deck.

Fig. 2, a side view of one of them; the same letters of reference applying to both figures; *a*, *a*, *a*, posts, 12 feet 2 inches high, and 6 inches thick: *b*, vanes, 6 feet 4 inches long, and 10 inches broad, fixed on the spindle *c*, and turned by means of a cord passing round the shivers *d*, *e*, which work

work in the centers of the posts: *f*, *f*, small wheels attached to the spindles of the shivers, *e*, and on the edge of which are marked the figures 1, 2, 3 and 4, as corresponding to the different positions of the arms or vanes: *g*, *g*, *g*, lashings, to confine the posts to the ship's side: or the posts may be fixed on trucks, to be moved from one part of the ship to the other: *h*, *h*, *h*, blocks of wood, into which the posts are stepped, if applied to the ship's side.

Fig. 2 is a representation of the shivers *d*, *e*, and small wheel *f*, with the cord viewed in front, without the vane.

Fig. 4 is a side view of the same parts, and in which the vane *b* is also shown.

The arm on the foremost post, when placed in the four positions diagonally to the post, exhibits the numbers 1, 2, 3, and 4; and the arm on the outermost post the numbers 5, 6, 7, and 8.

The THANKS *of the Society were this Session voted to Admiral* SIR HOME POPHAM, *of Greenwich, for his Section of Flags cut on an improved system. The following Communications were received from him on the Subject, and a Section of the Flags is preserved in the Society's Repository.*

SIR HOME POPHAM presents his compliments to DOCTOR TAYLOR, and he takes the liberty of sending him a section of the flags cut on an improved system, and which have already been exhibited at Deptford before the Committee from the Society of Arts, &c.

By

By the new method of cutting the flags, it will be seen, that the selvages of the buntin are brought on the outer edges of the flags, and the gorings in the center; by which means the outer edge is susceptible of the least air of wind, and when the flag blows out, the gorings assist in keeping it out. Whereas, the old flags had a hem on the outside, which rendered them difficult to be moved without a fresh breeze, especially in damp and rainy weather, as the hem then became very heavy: besides it is impossible, from the nature of the buntin, to sew a straight seam, for the instant it is cut it will become in some degree curved.

Greenwich, 25th March, 1816.

To C. Taylor, M.D. Sec.

Certificates *in favour of* Sir Home Popham's *Section of Flags.*

Having been at sea all my life-time, many years in the King's service, and now Master-attendant in his Majesty's Yard at Woolwich, I can safely state, that I never saw a triangular flag or a corvette made with selvages on the outside, till Sir Home Popham proposed it.

These description of flags are not much used in the merchant service, except the East-India Company's. It is a very superior method of cutting flags; and Nicholas Heath, the tailor and flag-maker of his Majesty's Yard at Woolwich, (to whom I have read this paper,) says he never saw any flags cut in this manner before, and, as a declaration of which, he

he has subjoined his name. It also insures an immense saving of buntin.

THOMAS BROWN, Master Attendant.

NICHOLAS HEATH, Tailor.

Woolwich Yard, 1st April, 1816.

SIR,

I HAVE received your note of the 22d, to wait on the Committee of Arts this evening, concerning the method of cutting flags by Sir Home Popham: I am sorry my duty prevents me from attending this evening, but will at any other time if required.

I beg leave to enclose a Certificate signed by the Storekeeper of this dock-yard and myself, which you will be pleased to lay before the Committee.

I have the honour to be,

Your very obedient humble Servant,

THOMAS BROWN.

His Majesty's Dock Yard, Woolwich, 24th April, 1816.

To Mr. WOODFALL, Assistant Secretary, &c.

THESE are to certify, that flags made on Sir Home Popham's principle have the following good qualities, viz.—The flags and pendants are much better shaped, sewed, lighter, and no waste of buntin, they, being all cut out to the selvage, do not require to be turned in, as was the case in making the flags on the old plan, which could not be avoided. Flags made

made on the new plan appear to blow out much better than the old, and will not be so liable to contain wet, but must dry much sooner; for, whenever buntin comes to be put away wet or damp, it is sure to rot.

Dated at his Majesty's Yard at Woolwich, the 24th day of April, 1816.

THOMAS BURNETT, Storekeeper.
THOMAS BROWN, Master Attendant.

Extracts from two Letters from Thomas Netherton, Esq. Clerk of the Survey of Deptford Yard, to Mr. Richard Peacock, of Chancery Lane, on the subject of Sir Home Popham's mode of cutting Buntin.

Deptford Yard, dated 2nd April, 1816.

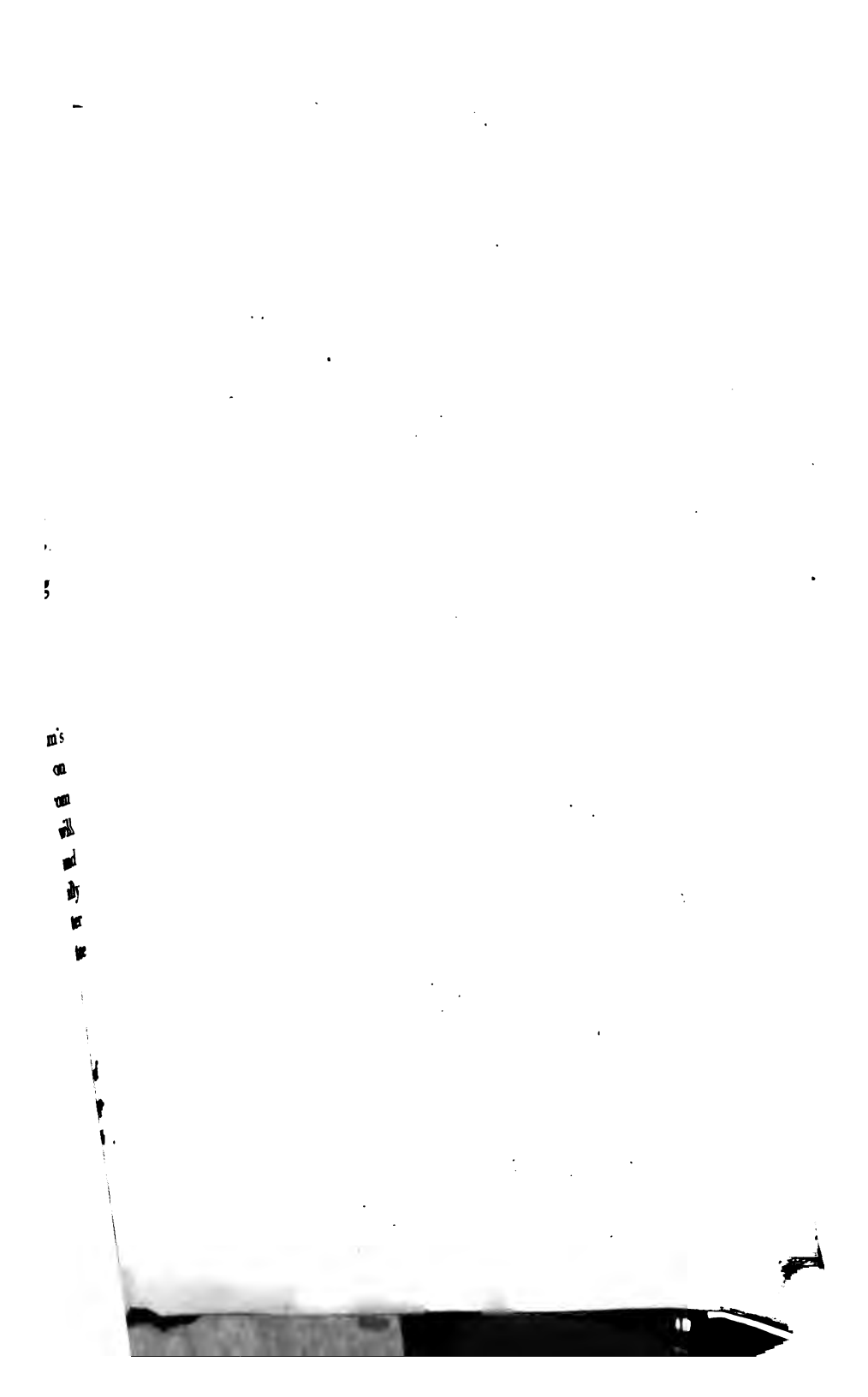
"DEAR SIR,

"In return to your favour respecting Sir Home Popham's Signal Colours, I have communicated with his Secretary on the subject. A great saving of buntin, as to wear, arises from the selvage being on the outside of the flag. The flag will likewise open to the wind better than the old ones; and many other advantages attend the plan, which will be fully explained on Thursday evening by Mr. Brown, the Master Attendant at Woolwich Yard, who will meet the Committee for that purpose."

Received 4th April, 1816.

"MY DEAR SIR,

"In addition to my letter of yesterday, on the subject of the Signal Flags and Pendants invented by Sir Home Popham,



ham, I have to day had reference to and compared them with those formerly in use; and, I am fully convinced of their superior utility, and, I may add, from the long experience and observation I have had opportunity of making on the subject, that the mode of cutting and making is original."

The GOLD ISIS MEDAL *was this Session voted to the Rev.* EDMUND CARTWRIGHT, *D. D. of Hollanden House, near Tunbridge, Kent, for a Traversing Apparatus. The following Communications were received from him, and a Model of the Apparatus is preserved in the Society's Repository.*

SIR,

I HAVE lost no time in sending you my cheap and portable substitute for a horse-mill. I have enclosed also a paper on the subject of it, which may be of use to those who are not much conversant with mechanical matters.

I am, Sir,

Your obliged Servant,

EDMUND CARTWRIGHT.

P.S. When you see Dr. CHARLES TAYLOR, I will trouble you with my compliments to him, and tell him how sorry I was to hear of his indisposition.

Hollanden House, near Tunbridge, Kent,
January 8th, 1816.

To Mr. GILL, St. James's Street.

A cheap and portable Substitute for a Horse-Mill.

It must be obvious to any one, in the least conversant with the subject, that many valuable machines, requiring more than a man's power, are prevented getting into general use, by the heavy expence of erecting a horse-mill to work them. A machine, the prime cost of which would, in many cases, exceed ten or twelve pounds, cannot be set in motion, by means of a horse-mill, under five or six times that sum.

To remedy this inconvenience, I tried several methods to produce a rotary motion by making the animal that was to produce it traverse backwards and forwards in a straight line, instead of moving in a circle. After several less happy attempts, I had the good fortune to hit upon a method, which, for simplicity and cheapness, can hardly be improved upon. It is this: A pulley being put upon the axis of the machine, an endless rope or cord is passed over it, which is carried out to any given distance over another pully fixed to a post, or any thing else that may be convenient. To this endless rope or cord the animal is attached, by means of the apparatus which accompanies this paper, which is so contrived, that, as the animal traverses one way, the apparatus grasps that part of the cord which lies on the top of the pullies; when he returns back, the apparatus grasps that part of the rope or cord which passes on the lower side of the pullies, thereby making the machine always to revole in the same direction, notwithstanding the animal's motion is reversed.

It may be objected to this mode, that, while the animal is turning, time will be lost by the machine standing still. Upon the whole, there is reason to believe, that there is little or no actual

actual loss, because, while the animal is turning, his labour ceases, and this momentary pause prepares him for a fresh exertion. This objection, however, is at once done away, by having a fly-wheel on the axis of the machine, which will keep up its velocity for a longer time than while the animal is turning round. It is needless to point out the great superiority of this mode of draft to that in which the animal walks in a circle. It may be calculated as nearly three to two.

In many machines, thrashing-machines for instance, it is a great desideratum to have them portable. This, it is true, is already done, but not without expence and considerable trouble and inconvenience, the mill-work required to give them motion being cumbrous and heavy, and requiring more care and skill to take them down, and put them up again, than common farming servants have to bestow. The whole apparatus, in the way now proposed, a man may carry in his hand.

There are two inconveniences in driving a machine by means of a cord and pulley, in the common way, especially if loaded with much work, which every one must have experienced; if the cord is not sufficiently tight, it is liable to slip, and, to give it the necessary degree of tightness, occasions such a load of friction upon the pivots of the pullies, as to add very materially to the labour. These inconveniences, however, may easily be got over by a very simple contrivance, which, as perhaps it is not universally known, I will describe. The width of the pulley upon the face should be about three diameters of the cord, and conical, and the higher side of the face should exceed the lower by about a semi-diameter of the cord, which must be laid on upon the higher side, and trussed once entirely round the pulley. It will

thus embrace the pulley three times as much as it would have done if laid on in the common way. The consequence will be, that the cord may be comparatively slack, and will lay no more friction on the pivots of the pullies, than would be laid on the pivots of the wheels in machines working by tooth and pinion.

P. S. The smith who made the apparatus, in consequence of its being a new thing, and requiring many little alterations before it was finished exactly to my mind, charged for it twenty shillings. Now that there is an exact pattern to go by, it would no doubt be made for half the sum. The cord which I made use of was rather better than the third of an inch in diameter. My animal was a small ass.

Sir,

In compliance with your opinion, I have endeavoured, on the other leaf of this paper, to make a drawing, such as it is, of the manner in which the ass was yoked to the traversing implement. Should there be a plate of it, your engraver must rectify the errors in perspective and proportion, which his eye will immediately point out to him; and he must have the traversing implement to copy from, which ought to b done accurately.

I am, Sir,

Your obedient Servant,

EDMUND CARTWRIGHT.

To Mr. Gill, &c.

Jan. 16, 1816.

The implement which I sent was not a copy, but the *actual thing* which I made use of.

Reference

Reference to the Engraving of Dr. CARTWRIGHT's *Apparatus for applying Horse Powers to Machinery, in a straight, instead of circular, Walk. Plate* 16.

A horse is working the machine by means of a revolving band, extended along the barn side by two pullies, one of which is on the axis of the machine within; the apparatus, which attaches the horse, is shown larger on another revolving band *a*, *b*. In front of the picture, the horse pulls the chain *c*, which opens the upper clip, D, and bites the lower rope in the under clip, E, and pulls it along with him, (the friction of the upper rope being eased by two rollers, F and G;) and, when he returns, he pulls the chain *c* back, as shown in fig. 2, which closes the upper clip on the rope, and pulls it along; the under clip opening lets the lower rope pass through on the rollers. The chaps of the clips are cut like a rasp to hold the rope fast. At fig. 3 is shown the alternate tapering of the two pullies, to let the band slide down, while coiling on the pully, as it is passed once or twice round to get securer hold, when both are wanted to work machinery. If a large pully be used, a small one, as shown on the barn side, is placed near to render the cords parallel again, and keep the proper width for the instrument. If the pullies are high, the horse may be attached to the under end, or, if low, to the upper one. The near rope shows how the walk may be lengthened by fixing a pulley to a post, in a line with the barn side. Fig. 4, is a front view, showing the clips D and E, and the rollers F F, and G G.

The GOLD MEDAL *was this Session voted to the Son of the late Major* CHARLES LE HARDY, *of Jersey, for a Method of effecting Communications between stranded Vessels and the Shore. The following Communication was received from his Father, Major* LE HARDY, *previous to his Death.*

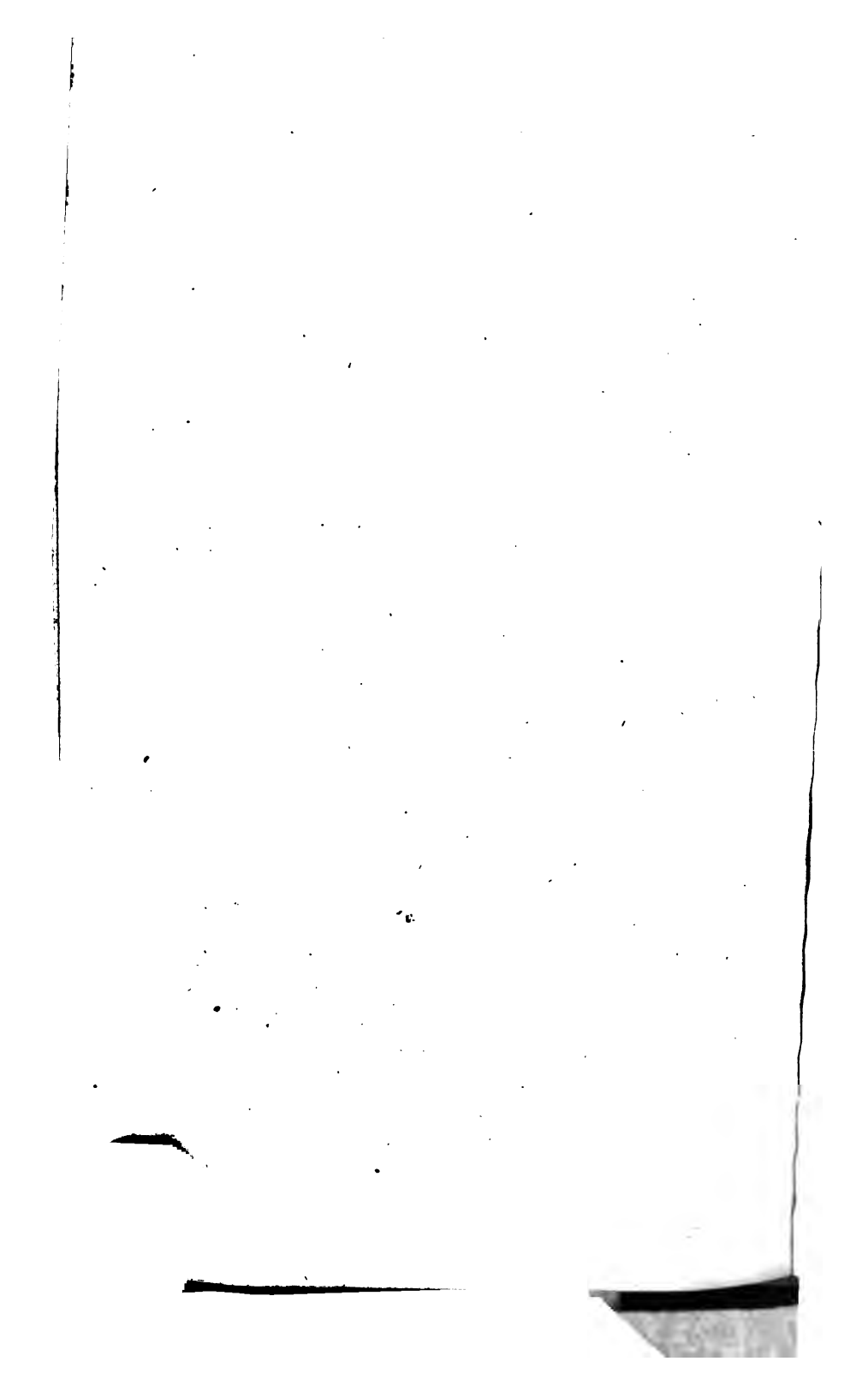
SIR,

I SHOULD be wanting in humanity if I did not communicate to the Society the result of several experiments which I have lately made with kites, to establish a communication from stranded vessels with the shore. To effect which, a kite should be made of light canvas, or brown Irish, which, when clear of the vessel, should be attached to a log of wood floating in the water, by a small line connecting them. This log of wood should be shaped like a flat-bottomed boat, and should have three pieces of iron well fixed to it, like those of a grapnel. If the line of the kite was fixed on either side of the log, it would deviate to the right or left; and, if in front, it would go in the direction of the wind. If, therefore, a stranded vessel had not exactly a lea shore, or, if some parts of the shore were only accessible, yet, by means of the line, and particular mode of its attachment to the log, it would be conveyed and fixed on that part of the shore which would best answer the purpose, dragging with it a cord from the ship to the shore. Such has been the result of several experiments I have made from the rocks across St. Aubin's bay, in the presence of many gentlemen: some of them were made in stress of weather with Captain Le Geyt.

Should the Society require further information on the subject,

Drawn by Cornelius Varley — Engraved by A.W. Wa

Capt.n Chas Le Hardy's method of communicating with y



ject, I shall feel great pleasure in transmitting the same; and am, Sir,

Your obedient humble Servant,

CHARLES LE HARDY.

Jersey, January 28th, 1812.

To C. TAYLOR, M.D. SEC.

CAPTAIN ROSE, R. N. attended the Committee when the subject was considered, and stated, that he thought the invention could not fail of its intended effect; nor could he suggest any improvement.

Reference to the Engraving of Captain CHARLES LE HARDY'S *method of communicating with the Shore, from a Vessel in Distress. Plate* 17.

A kite is shown drawing a float to the shore: the wind is blowing obliquely, yet the float is coming nearly direct, the kite string being fixed on one side. Another float is ashore; part of the kite-string is shown attached to one side, and men are bringing a boat ashore by a rope from its stern, having a stronger rope from their stern to the ship.

Two other floats on the fore-ground, show their form.

The

The GOLD ISIS MEDAL *was this Session voted to Mr.* WILLIAM BREMNER, *of Lower Eaton-street, Pimlico, for an Apparatus for the Extirpation of Polypi. The following Communication was received from him, and the Apparatus is preserved in the Society's Repository.*

SIR,

I BEG leave to submit for the Society's consideration my instrument for the extirpation of polypous tumours.

It consists of a silver cannula, from four to eight inches long, either straight or slightly curved, according to the size or situation of the polypus, and has two longitudinal grooves for the reception of two corresponding feathers on the tail of a double thread hollow steel screw, three inches long, and about an eighth of an inch in diameter, which moves in the tube by the action of its nut.

The following is the method of applying it for an operation:—Draw the double of a strong silk cord by means of a wire through the screw and cannula, and place the noose into a notch-pointed probe, which an assistant is to insert to the root of the tumour, and retain there till the operation has introduced the cannula directly opposite the probe, separated the two parts of the ligature over the apex, and thus completely included the root of the tumour into the noose of the ligature, which is now to be made fast into the circular groove of screw head, the probe withdrawn, and the necessary constriction produced by turning the nut; or, in the event of any tetonic affection taking place, the ligature may be again relaxed by turning the nut the contrary way.

The

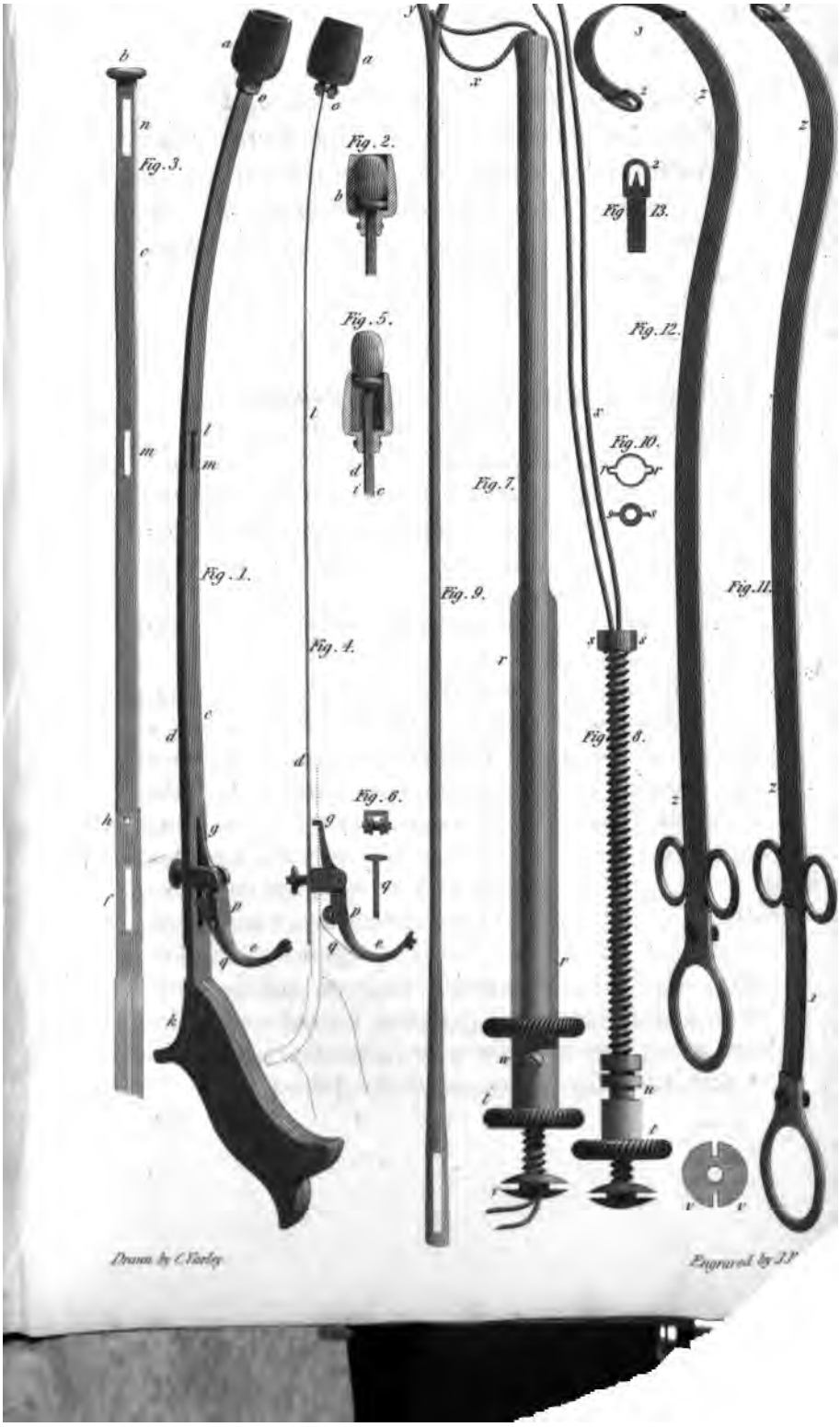
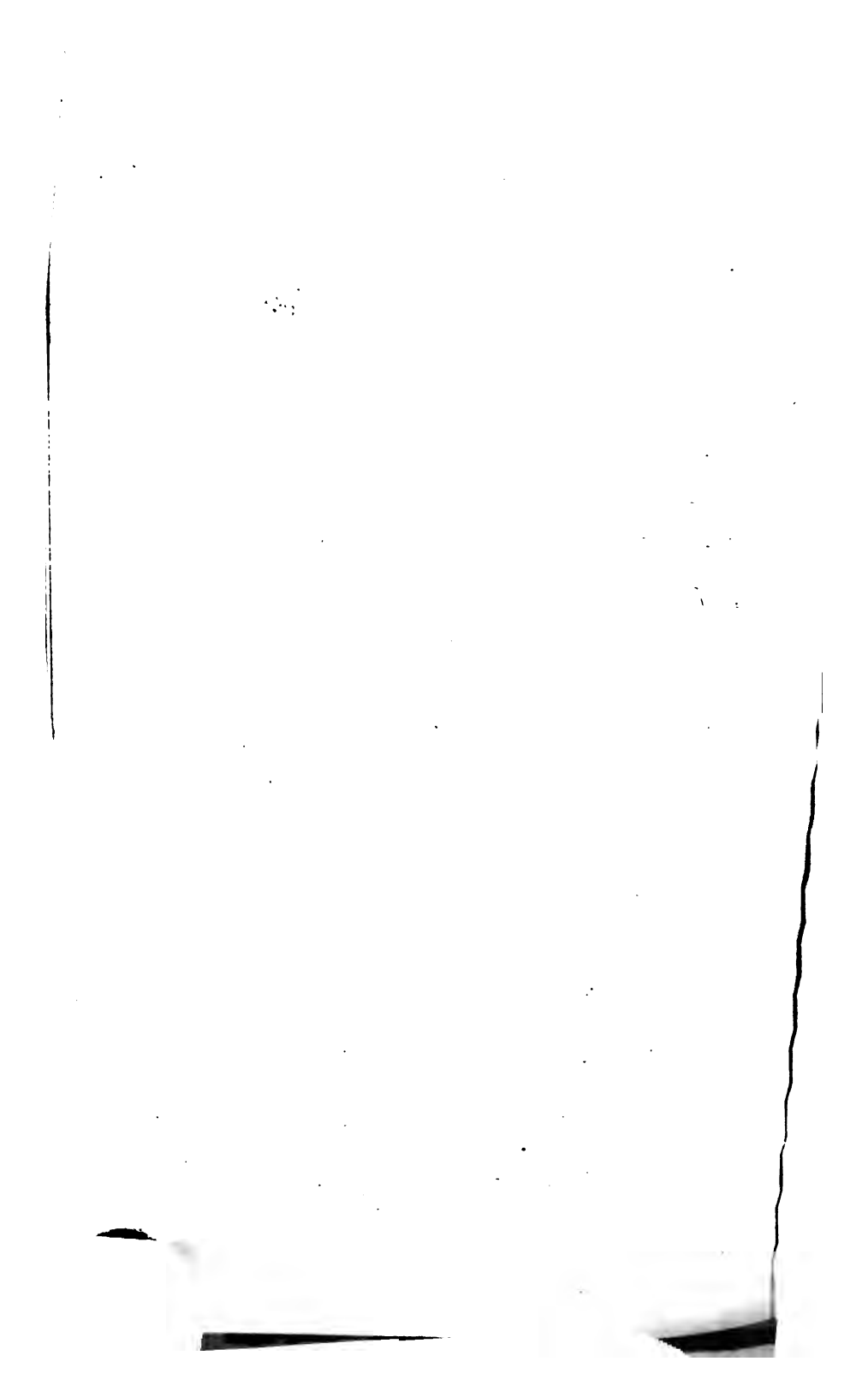


Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 8.
Fig. 9.
Fig. 10.
Fig. 11.
Fig. 12.
Fig. 13.
Drawn by C. Varley
Engraved by J.P



The operation being finished, it will be proper to tie a piece of bladder over the outer end of the instrument, in order to protect the screw frem corrosion by the fetid discharge which takes place. The bladder may be left sufficiently loose over the head of the screw, as may render it unnecessary to remove it for turning the nut; and, if the instrument be properly constructed at the point, so that the ligature may fill it, no discharge can ever reach the screw: I mention this to obviate any objection which might be adduced against its adoption.

This instrument, though extremely tight, is of sufficient power to entirely supersede that exertion of manual strength formerly employed in the extirpation of large polypi; and it is evident that whatever force was used in tightening the ligature, a corresponding resistance must have been made on the cannula; therefore, should the ligature by chance break, must not the end of the instrument be suddenly impelled against, and probably to the great injury of parts naturally tender, but in such cases frequently in an extremely irritable state? The Society will, on inspecting the instrument now before them, and the principle on which it acts, readily perceive, that its application cannot be attended with danger or difficulty, but that it may be advantageously employed for the removal of polypi, diseased tonsil or tongue, either by means of a cord or wire, as the peculiarity of the case may indicate: for the latter, with the aid of the above instrument, may be used the fortieth part of an inch in diameter, which will be found sufficiently firm to direct its own noose, without the assistance of a probe, and which, in some cases, would be the best method of proceeding, but particularly in that of polypi of the œsophagus; here, unless the tumour can be thrown into fauces by the excitement of vomiting the extir-

pation

pation of it is considered impracticable *, but, in the following way, ought certainly to be attempted;—after inserting the double of the above sized wire into a cannula, leaving the noose as wide as may easily be made to descend the œsophagus, till it has passed the tumour a considerable distance, when the cannula and one part of the wire are to be steadily held, while the other part is to be slowly drawn out; by this we dilate the noose as much as the œsophagus will admit of, and have a chance of including the tumour.

As the above operation will not give any great pain to the patient, if the operator be careful to avoid irritating the epiglottis; should the first attempt prove abortive, a second or third may succeed, in which case, the first cannula is to be withdrawn, and another substituted, the lower part of which is elastic. The remaining part of the operation has been already described.

I have the honour to be,

Sir,

Your most obedient humble Servant,

WILLIAM BREMNER.

To C. Taylor, M.D. Sec.

No. 8, Lower Eaton Street, Pimlico,
26th March, 1816.

SIR,

I have yet further to solicit the Society's attention to an instrument for conveying ligatures round deep seated arteries, but especially the subclavian.

* See Samuel Cooper's System of Surgery.

It

It consists of a flat curved silver tube, through which three springs slide, which at one end are rivetted into a silver eye, but, at the other, merely slipped into a socket, to which the outer spring only is screwed, the two inner ones being permitted to move out or in, according as the instrument be in an extended or curved state.

The utility of the number of springs requires no illustration, when the visible motion of the two inner ones at the socket must convince any one that no solid spring of the requisite thickness, howsoever manufactured, can ever possess an equal elasticity, and, as the instrument must act as a solid knaculum in every degree of curvature it partakes of, both the strength and smallness of the curve are equally essential; hence the instruments hitherto constructed for the above operation, have either been found too weak to perforate, or else remained buried into the cellular substance underneath the artery; in this case, what must be the situation of the surgeon, and still more that of the patient, whose life depends on the issue? From being once similarly situated, I was induced to turn my attention to devise those means best calculated to prevent its recurrence; with this view, I constructed the above instrument, which is to be used in the following manner:—Place the noose of a ligature over the tongue, in the eye of the springs, and the vessel being laid bare, the operator is to direct the point of the instrument with his right hand, and, with the forefinger of his left inserted into the wound, be careful not to include any nerve, while an assistant, at the direction of the operator, is slowly to push forward the springs to their full extent, and again withdraw them into the cannula; by this means, the noose is thrown off from the little tongue, and may be laid hold of.

The

The rest of the operation is too well known to require description.

I am, Sir,

Your most obedient humble Servant,

WILLIAM BREMNER.

No. 8, Lower Eaton Street, Pimlico,
26th March, 1816.

To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Mr. WILLIAM BREMNER'S *Instrument for conveying ligatures round deep-seated Arteries. Plate* 18.

Fig. 11, is the instrument of its real size, consisting of the flat curved silver tube, *z z*, having at one end two small rings, for being more conveniently held. The three springs which slide through the tube are all rivetted to the silver eye, 2; but, at the opposite end, the outer one only is screwed into the silver socket, the other two being permitted to move freely out or in, according as the instrument changes its figure.

Fig. 12, represents the instrument when it has conveyed the ligature round the artery, 3, and ready to leave the ligature perfectly within reach.

Fig. 13, is the silver eye, showing the little tongue. It may be necessary to observe, that the springs, though common watch springs, have all been re-tempered in one close coil, as they are always left by the spring-makers too low tempered for the above purpose.

The

Fig. 1

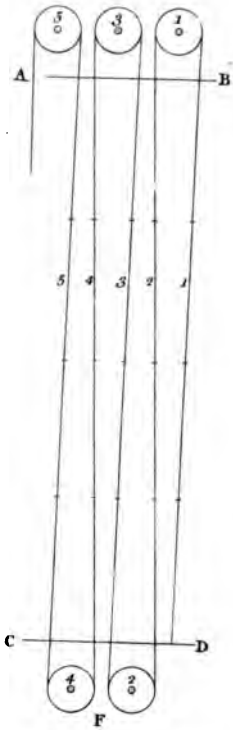
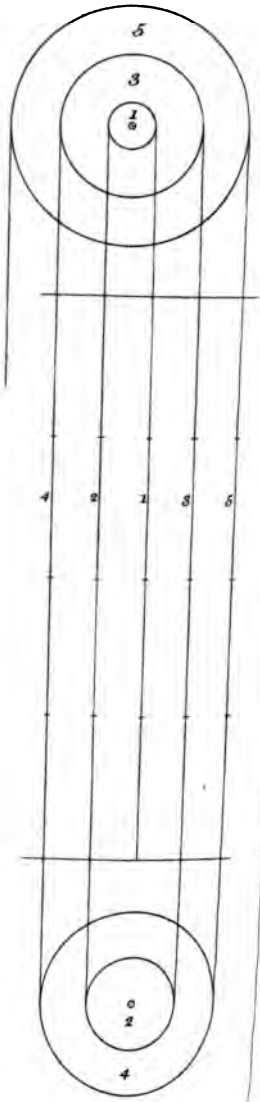


Fig. 2

Fig. 3



Lieu.t Shuldhams

Blocks.

J. Davis sculp.

Lieu.t M. Shuldhams New Iron Block.

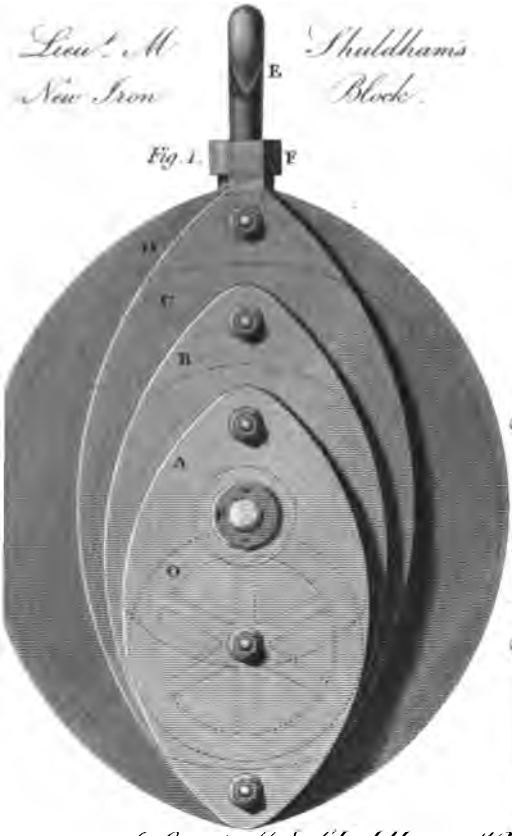


Fig. 1.

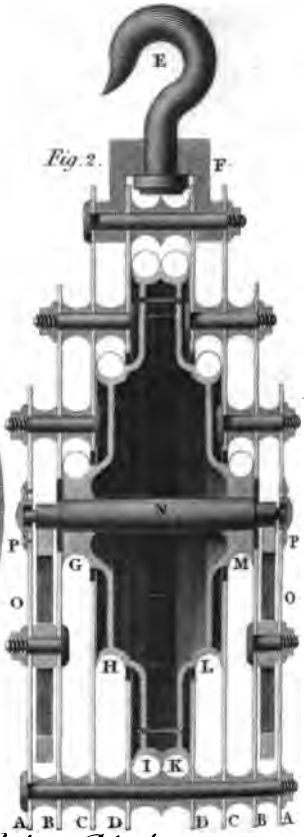


Fig. 2.

Lieu.t M. Shuldham's Wooden Block.

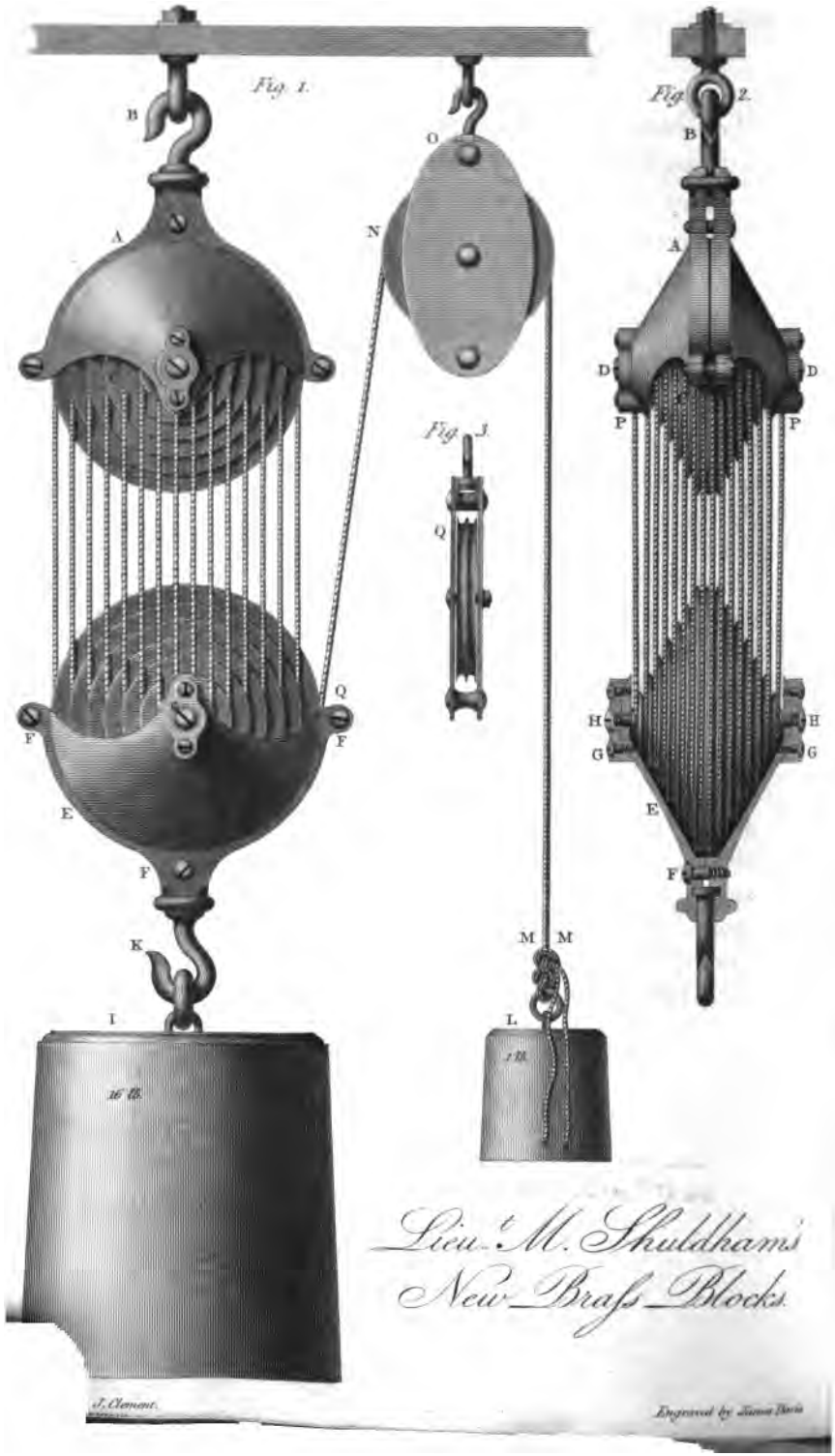
Fig. 3.

Fig. 4.

Fig. 6.

Fig. 5.

Engraved by J. Barrl.



Lieu.t M. Shuldham's New Brass Blocks.

J. Clement.

Engraved by James Basire

The GOLD ISIS MEDAL *was this Session voted to Lieut.* M. SHULDHAM, *R. N. of Great Titchfield-street, for improved Pullies and Blocks. The following Communications were received from him, and Models of the Pullies and Blocks are preserved in the Society's Repository.*

SIR,

I BEG leave to have the honour of submitting to the consideration of the Society for the Encouragement of Arts, &c. some models of an improvement I have made on pullies and blocks.

The improvement consists in fixing the axis of the pulley to the shieve, and causing it to turn on two single friction rollers, which are placed in the shell of the block; and, as I make use of a concentric grooved shieve, only two of those rollers are necessary for a block, whatever may be its combination; also the block is so contrived, as to admit of two separate ropes passing through it, instead of one, by which means those parts of the rope where the working power is applied, will be acted upon directly from the centre of the block, thereby tending to keep in a perpendicular direction; and the ropes, from being smaller, will the more easily bend themselves round the shieves. These improvements I found prevent much friction; and therefore, I trust, render the block more perfect than those now in common use.

I have the honour to be, Sir,

Your obedient and very humble Servant,

MOLYNEAUX SHULDHAM,

LIEUT. R. N.

No. 49, Great Titchfield Street, April 9, 1816.

To C. TAYLOR, M. D. SEC.

CERTIFICATE.

CERTIFICATE.

THIS is to certify, that I have inspected Lieutenant SHULDHAM's improvements on blocks and pullies; and I am of opinion they would, particularly with the addition of the friction rollers, prove beneficial to the East India Company, and Merchant Service, or for any other purpose where the saving of manual labour would be an object; and, from the plan of the friction rollers being more simple than any hitherto applied to blocks, the axis of the rollers, in my opinion, would not be so liable to break or get out of order. I also certify, that I have seen his contrivance of a simple method of applying more men to move round the capstan when required; as this plan is put into exertion with great facility, and is not attended with any expence, I am of opinion that its adoption would be found generally serviceable throughout the navy.

Given under my hand, in London, this 20th day of April, 1816.

T. W. HARDY,
Captain of H. M. Yatcht *Princess Augusta.*

Reference to the Engraving of Lieutenant SHULDHAM's *Pullies and Blocks. Plate* 19.

Fig. 1, is supposed to be a tackle composed of a three and two-fold block, the five shieves of which turn upon separate pins, and are of equal diamaters, as they are in blocks now universally used; they are numbered 1, 2, 3, 4 and 5, to correspond with the quantity of rope passing over them, each part of the rope being also numbered. The space from A to

to C is four times the circumference of one of those shieves, therefore, if the block F, be hoisted up until the line C, D, cut that of A, B, it will be evident that the shieve numbered 1, will have made four revolutions; No 2 eight, No. 3 twelve, No. 4 sixteen, and No. 5 twenty. In fig. 2, the diameters of the five shieves are increased in the same proportion as they are numbered; so that, if the lower block was hoisted until the two lines at each shieve, notwithstanding they revolve on separate axes, would have made the same number of revolutions, viz. four. That being shown, it will be evident, that a pulley of my combination can be made with one shieve, by constructing the diameters of the concentric grooves of it, in proportion to the quantity of rope passing over them. See fig. 3.

Reference to the Engraving of Lieutenant M. SHULDHAM'S *New Iron Block. Plate* 20.

Fig. 1, is a front view, and fig. 2, a section of the block; the same letters of reference applying to both figures; it is constructed of eight wrought iron plates, the shapes of four of which ABCD, are shown in fig. 1; and the other four, on the opposite side of the block, are similar to them; these are united together by screw-bolts, with collets put in between the plates, to keep them at a proper distance from each other; the hook E, turns in a hole made in the staple F, thus forming a swivel.

The pulley is made of cast-iron, having three concentric grooves on each side of it, as shewn by the letters GHIKLM, fig. 2, and is made hollow, for the sake of lightness: it is formed in two similar parts, which are joined together by screws

screws near its outward circumference: it is made fast upon the axis N, instead of turning thereon, as is usual; and the axis has two pairs of necks, formed truly cylindrical; the largest of which are supported by, and turn upon, the two friction wheels O, O; the smaller necks are received into two hard steel caps P, P, screwed firmly to the iron plates, A, A, in order to keep the axis in its place: these caps have oblong holes within them, with flat bottoms, which fit the smaller necks of the axis sideways, but allow them to rest upon the friction wheels; and the flat bottoms of the holes in the caps are made to touch the ends of the axis, which are made a little convex in their centers; and thus diminish the friction, sideways, of the shoulders of the axis.

Reference to the Engraving of Lieut. M. SHULDHAM'S *new Wooden Block. Plate* 21.

Fig. 3 is a side view, fig. 4 a section, and fig. 5 a front view of the block, with its rope and iron thimble; the same letters of reference applying to all the figures.

A, fig. 4, is a pulley or sheave made of hard wood, and is fast upon its axis B; it has three concentric grooves on each side of it: the axis B, has two pairs of necks or pivots, the larger of which rest and turn upon the two friction wheels C C; whilst the smaller are received into oblong cavities in the brass plates D D, which fit them sideways, but allow them to turn upon the two friction wheels: steel plates, dovetailed at the ends of these cavities, are caused to touch the rounded ends of the axis to prevent its shoulders from producing friction.

The

The axes of the friction wheels C C, are supported in pivot holes made in the brass plates D, D, and in two other plates E, E; all which four plates are screwed fast to the block by the four screws F, F, F, F.

The block itself is made in two similar pieces, hollowed out to fit the pulley, and joined together by screws G, G, G, (the holes in the wood, above their heads, being closed by plugs), and double dove-tailed plates, one of which is shown at H, fig. 3; and having also apertures on each side of it, one of which is shown at I, fig. 5, in order to screw in the brass plates D, D, and E, E, and which apertures are also afterwards closed by pieces of wood made to fit them, one of which is shown at fig. 6, and screwed by five screws in each.

Eight holes are made through the lower end of the block, four of which are shown in fig. 3, to let the ropes pass through; besides, the two double side orifices, for the same purpose.

Reference to the Engraving of Lieut. M. SHULDHAM'S *New Brass Blocks. Plate* 21.

Fig. 1, is a front elevation of the compound blocks, and double grooved pulley; and figs. 2 and 3, are side views of the same.

A, A, figs. 1 and 2, is a brass block or frame, suspended by the hook B, and having within it a concentric grooved pulley or sheave, C, C, turning upon its axis, D, D; the upper part of the pulley is concealed by the block.

E, fig. 2, is a section of the lower block, similar to the upper one, the inner part of it being made just to clear the projections of the pulley, so as to prevent the ropes from

getting out of the proper grooves in it. The block is formed in two similar halves, and is united firmly together by the three screws, F, F, F; a piece of brass, G, G, is secured on each side of the block by two screws, and has, in its centre, a screw of hard steel, H, which is made to touch the convex end of the axis of the pulley in its centre; and the other end being also touched by the opposite screw, H; the pulley is thereby prevented from side shake, or its shoulders from coming into contact with the frame, and thereby causing friction. To the lower block, E, fig. 1, is a weight, I, of sixteen pounds, suspended by the hook, K, and this is kept in equipoise by the weight, L, of one pound only, which is suspended by the two ropes M, M, passing over the double grooved pulley, N, in the block, O.

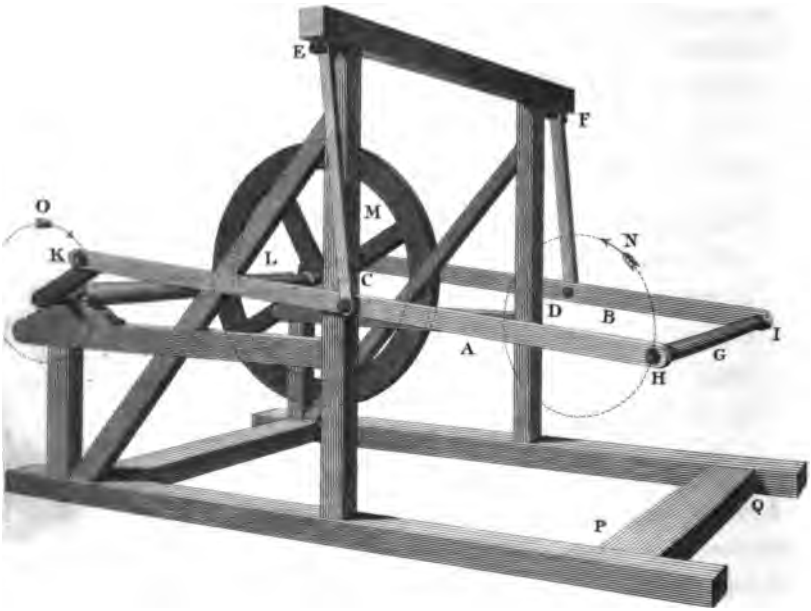
To rig or reeve these blocks, first make the two ropes fast to the upper block, at P, P, fig. 2; then pass them round the two external or smallest pair of similar grooves in the lower pulley; next round these, in the upper one; then round the second grooves in each pulley; and, so on, till they come to the largest, at Q, fig. 1, from whence they pass over the double grooved pulley, N, in the block, O, and are united to the acting weight, L; and, by being thus doubled, and acting in each side of the pulley alike, they constantly tend to keep it upright; and, besides, the united friction of two small ropes is much less than that of one of double their strength.

N. B. The diameter of the grooves in the pulleys must be calculated from the center of the rope, when put round the pulley; for, as the rope will be flattened a little, in bending round the pulley, when a heavy weight is applied to it, it will, consequently, be less in diameter; and still more so, when the rope becomes flexible.

The

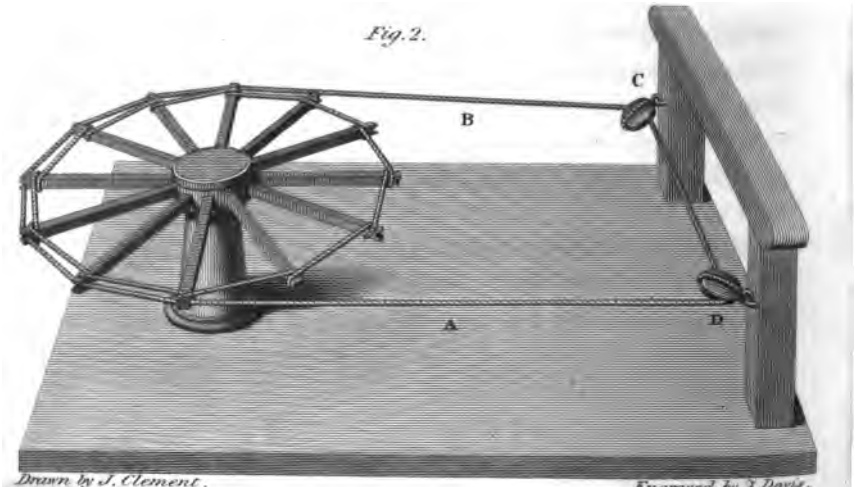
Chev. Baader's Rotary Motion.

Fig. 1.



Lieut.t M. Shuldhams Improved Capstan.

Fig. 2.



Drawn by J. Clement.

Engraved by J. Davis.

The diameter of the grooves in the lower pulley, from centre to centre of the rope, must be in the following ratio to each other, viz. 1, 3, 5, 7, 9, 11, 13, and 15; and, those in the upper one, to the following, viz. 2, 4, 6, 8, 10, 12, and 14.

The SILVER MEDAL *was this Session voted to The Chevalier* BAADER, *of Munich, for his method of communicating Rotary Motion. The following Communication, and an explanatory Drawings were received from him, which are preserved in the Society's Repository.*

SIR,

I BEG leave to offer to the Society of Arts the plan of a mechanical invention, which I have executed with success in my own country, but which is not yet known in this, nor published any where.

It is a method of communicating rotary motion to a considerable distance from the person or persons who turn the machine, and without the use of wheels or pinions, band-wheels, or any other of the usual means. I made use of it in an hydraulic machine to raise water from the foundations of houses, &c., the workmen standing on the bank or firm ground, and giving motion to an axis with cranks placed over the water.

I flatter myself, Sir, that this invention will be found so much more worthy of your celebrated and patriotic Society, as its utility is perfectly ascertained by the experience of a number of years in Germany; and, as its application may also prove beneficial to this country in many instances.

I am confident that the mere inspection of the plan will enable your Mechanical Committee to judge of the merit and effect of this invention; but, should it be found necessary, I will, with great pleasure, attend the Committee, to give any verbal explanation that may be required.

I am, with perfect esteem,

Sir,

Your most obedient humble Servant,

JOSEPH DE BAADER, M. D.

Knight of the Kingdom of Bavaria, and of the Order of Merit of the Bavarian Crown: First Counsellor of Mines, and Director General of Hydraulic Constructions to his Majesty the King of Bavaria: Member of the Royal Academy of Sciences at Munich, of the Mineralogical Society of Jena; of the Royal Medical Society at Edinburgh; of the Athenée des Arts, at Paris; and of the Societies for Emulation at Paris, Colmar, and Rouen.

No. 5, Salisbury Street, Strand, Nov. 8th, 1816.

To C. TAYLOR, M. D. SEC.

Reference to the Engraving of the Chevalier BAADER'S *Mode of communicating Rotary Motion. Plate 22.*

THE two levers, A B, turning on the centers, C D, of the moveable bars, E F, suspended on their centers, E F, attached

tached to the frame of the machine, having a turning handle, G, which connects their ends, H I, and being attached by cranks to the wheel and axle, K L M, at their other extremities, communicate any rotary motion given to the handle, G, to the wheel and axle, but in a reversed direction, as marked by the arrows, N O; and this, without the use of wheel-work, band-wheels, &c. as hitherto done.

In the drawing of the machine sent by the Chevalier De Baader to the Society, this contrivance was employed to communicate rotary motion given to the handle G, by labourers standing upon the platform, P Q, of the machine, on the bank of a reservoir, &c. from which water was to be raised, to the wheel and axle, K L M, placed over the water to work pumps, &c. as required. It may also be employed in a great variety of other situations with equal convenience; as, it is quite immaterial, whether the levers, A B, are suspended from above, as in this instance; below, or even sideways; and their points of suspension may likewise be varied, when necessary, by a suitable provision in their construction, so as to be placed either nearer to the wheel and axle, in order to act upon them by the handle, G, with greater leverage, to gain power; or farther from them to gain time; as, the handle G, then moving in a circle of lesser diameter, can consequently be turned more swiftly about.

The SILVER MEDAL, *was this Session voted to Lieut.* M. SHULDHAM, *R. N. of Great Titchfield-Street, for "Improvements in Working a Capstan." The following Communication was received from him, and a Model of the Capstan is preserved in the Society's Repository.*

SIR,

I BEG leave to present to the Society a very simple contrivance of mine for applying, with much ease and dispatch, an additional power to a capstan when required. The method has been tried on board his Majesty's brig *Cordelia*, and was found to answer. Many naval officers have also approved it, deeming the contrivance a particular useful one when applied to a ship's capstan.

I have the honour to be,
Sir,
Your obedient humble Servant,
MOLYNEAUX SHULDHAM.

No. 49, *Great Titchfield Street, April* 9, 1816.

To C. TAYLOR, M. D. SEC.

Copy of a Report of Lieut. George Eyre Powell, First Lieutenant of his Majesty's Brig Cordelia, relative to Lieut. SHULDHAM'S *method of applying more Men to the Capstan.*

"I have had an opportunity of trying your plan on the capstan, it answers in every respect as you stated; indeed, it

it is too great a purchase, as, yesterday morning, against a strong gale and tide, I clapped on your swifter, and had the pleasure to carry away a seven-and-a-half inch messenger; got the messenger removed to a fresh part, and carried it also away; so you may judge there was no foolish wind or tide. I was afterwards obliged to have recourse to a runner and pendant: the messenger was quite new when we left this place, and had not been used more than five or six times."

(Signed) G. E. POWELL, First Lieut.
Brig Cordelia.

Sheerness, Feb. 9, 1816.

To Lieut. SHULDHAM, &c.

CERTIFICATE.

I HEREBY certify, that I have seen Lieut. SHULDHAM's contrivance for the application of additional men to a capstan, when it is required to heave a great strain, and have no doubt of its efficacy; and, as it is not attended with any trouble or expence, I think the invention, when known, will certainly be generally adopted, its simplicity and utility being so obvious.

(Signed) A. BROWN, Commander, R. N.

April 26th, 1816.

To Lieut. SHULDHAM, &c.

Reference to the Engraving of Lieut. SHULDHAM's *improved method of working a Capstan. Plate 22.*

In addition to the usual manner of placing men between the capstan bars, the ends of the bars should have

notches or gaps made in them, in which an endless rope, A, B, is received, and passes through two pulley blocks, C, D; thus forming two straight lines, along which men being placed can act by pulling the ropes in the most efficacious manner upon the capstan.

The GOLD ISIS MEDAL *was this Session voted to Mr.* THOMAS PERING, *of Dorset Street, Salisbury-sq. for an Invention called* "The Expeditious Navigator." *The following Communication was received from him on the Subject, and one of the Tables is preserved in the Society's Repository.*

SIR,

I HAVE the honour to lay before the Society of Arts and Sciences an invention under the title of "*The Expeditious Navigator*;" and will, with pleasure, attend for the purpose of giving any elucidation it may require.

I am Sir,

Your most obedient humble Servant,

THOMAS PERING.

No. 117, *Dorset Street, Salisbury Square, Nov.* 15, 1815.

To C. TAYLOR, M. D. SEC.

SIR,

SIR,

I HAD the honour to transmit to the Society of Arts and Sciences, on Wednesday last, an attempt to simplify and facilitate the comprehension of the science of navigation, under the title of "*The Expeditious Navigator.*" The short explanation prefixed to it has been considered amply sufficient for those for whose use it is intended; but, as many members of the Society cannot be supposed to be conversant in nautical affairs, I will take the liberty of making a few additional observations on the subject.

It is well known, that a vessel sailing due north or south, makes all latitude; due east or west, all longitude; between any two quarters, both latitude and longitude, according to the course sailed; the two first cases speak for themselves; in the third, recourse must be had to some mode of calculation, of which there are several in use, all of them requiring time, and, as must be the case where many figures are employed, subject to error. The requisite information is obtained by referring to the right hand table, where, by placing the scale on the course sailed, will be seen how much latitude and how much longitude has been made on any given distance; as, in the first example, forty-seven miles on a course of two points and a quarter gives forty-two and a half of latitude, and twenty of *apparent* longitude, by seamen termed *departure*. It remains to find how much *actual* or geographical longitude is contained in the apparent longitude, which has been just ascertained; for, inasmuch as the degrees of longitude, narrow as we approach the poles, it follows that the longitude varies according to the distance from the equator; for this purpose, a fresh calculation must be resorted

to,

to, the necessity for which is obviated by the left hand table, when the longitude being geographically marked out according to the figure of the globe, I have only to place my scale on the degree of latitude in which I have been sailing to find the actual longitude comprised in the apparent longitude or departure, which has been just ascertained; as, in the second example, twenty miles of apparent longitude or departure in latitude sixty, gives forty miles of real or geographical longitude. On the same principles, and with equal facility by these tables alone, all the ordinary business of navigation may be performed.

Should my invention be honoured by the favourable opinion of the Society, I shall feel duly sensible of any mark of their approbation of which it may be considered to be deserving.

I have the honour to be,

Sir,

Your most obedient Servant,

THOMAS PERING.

No. 117, Dorset Street, Salisbury Square, Nov. 20, 1815.

To C. Taylor, M. D. Sec.

DEAR SIR,

From the rough plates I have seen of your improved navigator, and the mode of applying it, I have no hesitation in saying it is a most material improvement in that art, for, exclusive of its simple construction and ease of comprehension, I consider any mode hitherto not used that may tend to the correcting of the longitude of the greatest use, as all nautical instruments are liable to accident, and observations

we

we know are uncertain; and, next to the time-piece, this is the neatest mode I am aware of.

I am, dear Sir,

Your very faithful Servant,

PHILIP BROWNE.

Leamington, Nov. 22, 1815.

To C. TAYLOR, M. D. SEC.

I should have deemed it equal to the time-piece, if on a brass plate.

CAPTAIN HURD conceives the invention of Mr. PERING to be so highly useful and necessary to navigators, as to deserve all manner of encouragement; and therefore means to recommend its adoption and use to all his naval friends, and others who have occasion to traverse the ocean.

Hydrographical Office, Admiralty, Nov. 25, 1815.

To C. TAYLOR, M.D. SEC.

DEAR SIR,

I HAVE examined your expeditious navigator with great pleasure, and it appears to me to be an invention which, from its simplicity and ingenuity, is likely to be found of great utility.

I shall be happy in giving it all the publicity and recommendation in my power, and which I conceive it so richly merits. Wishing every success to your undertaking, which I shall be happy to promote, I am,

Dear Sir, Yours, most truly,

H. SNOW,

Superintendant Harbour Master of the Port.

Harbour Office, Tower Precinct, Nov. 25, 1815.

To Mr. T. PERING, &c.

DEAR SIR,

DEAR SIR,

YOUR brother has shown me your ready navigator, and I congratulate you on your happy ingenuity. It is a very pretty improvement upon the French "*Quart du Cercle*," whereby day's works at sea may be worked with great readiness and simplicity.

I am, dear Sir,

Yours, very sincerely,

M. MALLIDAY.

Penzance, Nov. 27, 1815.

To T. PERING, Esq.

SIR,

I WAS much gratified on receiving your brother's scale, the *Expeditious Navigator*, for inspection. It has brought the dead reckoning to such a short, simple, and accurate method, I have no doubt but it will be approved of by *all* classes of navigators. I will thank you to forward me a copy as soon as convenient.

I am, Sir, Yours, &c.

CHARLES GIDDY, Commander.

Penzance, Nov. 27, 1815.

To Mr. A. PERING, &c.

SIR,

I HAVE much pleasure in stating my opinion, that your invention of a table for the computation of day's works at sea, will be most useful; and that I hope to understand very

soon

soon it is in general use on board ships, on long as well as short voyages.

I am, Sir,
Your most obedient Servant,

J. BOULDERSON.

East India House, Nov. 25, 1815.

To T. PERING, Esq.

SIR,

YOUR invention for facilitating the computation of days-works at sea, I consider a useful auxiliary on ship-board, and more particularly to young navigators, or to those who are not expert at logarithmetic calculations; and consequently worthy the countenance of the public.

I am, Sir,
Your most obedient servant,

JAMES HORSBURG.

East India House, November 25, 1815.

To T. PERING, Esq.

*** It will not be irrelevant to the subject here to observe, that, though the Society, on all occasions, are extremely anxious to convey to the public, in as clear and concise a manner as possible, the nature and utility of the different inventions they reward, they nevertheless do not *always* accompany the description with an engraving. There are cases in which the Society consider a written communication perfectly elucidatory of the subject, and there are others, *particularly when an engraving of an invention has been previously published*, when they do not deem a descriptive plate necessary. The papers accompanying Mr. PERING's invention,

invention, are so satisfactory, and so much evince the utility of his "*Expeditious Navigator*," that the Society have dispensed with an engraving;—a circumstance, which, they are inclined to think, will not be regretted, when it is known that the tables are published on a larger scale than *they* could have embraced, by Mr. Carey, Map-seller, in the Strand.

The GOLD ISIS MEDAL *was this Session voted to Mr.* JAMES ALLAN, *of Blewitt's Buildings, Fetter Lane, for a Theodolite. The following Communication was received from him on the Subject, and a Model of the Apparatus is preserved in the Society's Repository.*

SIR,

I BEG leave to present to the Society of Arts, &c. through your medium, a theodolite upon a new principle; which is, instead of reading the divisions by a nonius or vernier, they are read by a micrometer; which method, I believe, will be found to facilitate the reading the divisions more accurately.

I am, Sir,

Your obedient Servant,

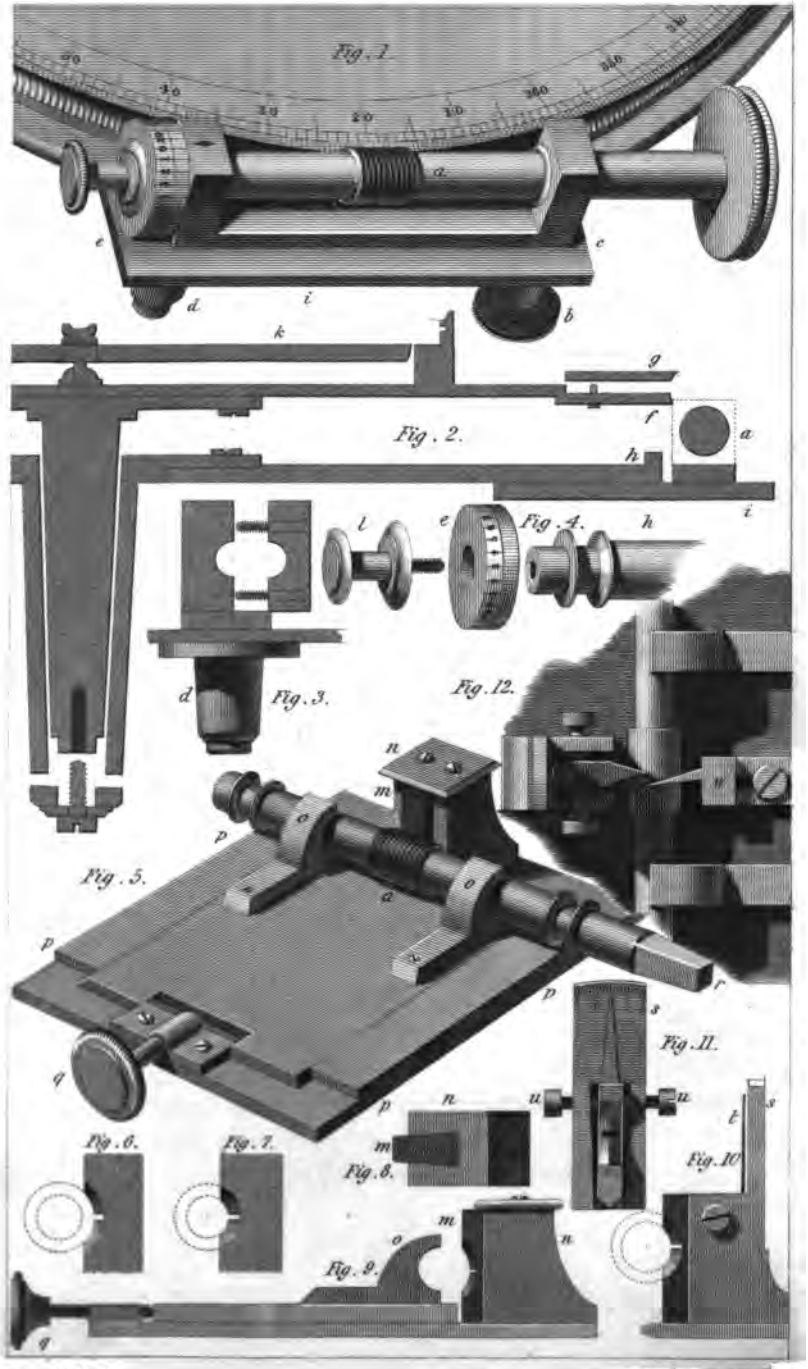
JAMES ALLAN.

Blewitt's Buildings, April 24, 1816.

To C. TAYLOR, M. D. SEC.

The

M.r Ja.s Allan's Theodolite, &c. Machine for Cutting of Screws.



Drawn by C. Varley.

Engraved by C. Mitchell.

The SILVER ISIS MEDAL *was this Session voted to Mr.* JAMES ALLAN, *of Blewitt's Buildings, Fetter Lane, for his method of making Screws for mathematical Purposes. The following Communications were received from him, and a Model of the Machine is preserved in the Society's Repository.*

SIR,

I BEG leave to inform you, that I have invented a simple and easy method of producing a correct screw, which I wish, through you, to submit to the Society of Arts, &c. I will do myself the honour to attend the Committee with the tool to-morrow evening, when, if permitted, I will cut a correct screw in their presence.

I have the honour to be,

Sir,

Your obedient Servant,

JAMES ALLAN.

Blewitt's Buildings, Fetter Lane, Jan. 22, 1816.

To C. TAYLOR, M. D. SEC.

SIR,

I BEG you will permit me to inform you, that I intend, with permission of the gentlemen of the Committee, to perform my promise next Thursday evening: I mean to cut a correct screw in their presence.

I have found that it is necessary to have two dies or cutters; the

the one to be larger in diameter than the other; the largest is the one proper to begin with, which should be sufficiently large to receive and fit, at the beginning, the part that is to be cut; if so, the very first turn is sure to form a proper screw. The whole of the teeth in this case will be in contact at once with the part that is to be cut. I would, however, finish with the second, and in case there should be any difference in the bearings, with respect to size, I would recommend to shift or reverse the screw in finishing; by which means the error, however little, will be split, and consequently a screw, as near perfection as imaginable, cannot fail to be produced.

The method is so simple, that it does not seem to be of much importance. Nevertheless, I beg leave to observe, that it is a well-known fact that a true screw is considered a very important thing, especially among many branches of mechanics, particularly if obtained, as in the present instance, with little trouble.

About twenty years back, I was with the late Mr. Fairbone. My work was mounting on a stand telescope of five and seven feet long: each stand had two screws, similar to what I cut with this tool; the one to give the telescope horizontal motion, and the other the vertical. I found, however, great difficulty in cutting the screws in common dies. I could not get them free of two faults; one of which was, that I could not get the thread to be of a true regular inclination; the other was, that in consequence of the force necessary to cut a screw in dies or screw-plate, they were sure to get bent and twisted. I never, therefore, could get them sufficiently true to their bearings, so as to act truly pleasant. These reasons, at that period, made me suggest the tool that I now submit to your consideration. The present Mr. Fairbone

Fairbone approves much of the method, and requested me to make a tool for him.

I have finished a new kind of theodolite, about eight inches in diameter; it is cut in the edge with a screw of this size into seven hundred and twenty teeth; each turn of the screw will be half a degree, so that a head, or what is called a micrometer, divided into a hundred and twenty divisions, will show quarter minutes. I shall be sure to get the teeth truly in their proper places by the correcting ring, similar to that on the dividing engine; for which I received the Society's Gold Medal.

The Screw I cannot have any doubt of getting properly true by the tool, and thereby will be able to show the quarter minutes by the micrometer instead of nonius. I also can divide it on its own axis by itself, by which means it will be pleasant to use, and more correct than theodolites hitherto in use.

I have mentioned my improvement to several surveyors, who think well of it, and are anxious to see it finished.

I am, Sir,

Your humble and obedient Servant,

JAMES ALLAN.

Blewitt's Buildings, Jan. 30, 1816.

To C. TAYLOR, M.D. SEC.

N.B. I should not have noticed the theodolite in this letter, but that it is inseparable from the screw.

SIR,

I HAVE to beg your pardon for claiming your attention to the subject of screw-making once more.

I have already said, that it is a simple and easy method to get a good screw. Any one, who works on metal, can make the tool, the expences of which will not come to more than common stocks and dies. It does not only make the screw true in itself and to its bearings, but it affords an opportunity of making a screw of considerable length proportionably true, that is, each thread shall be in its proper place. This is to be done by dividing it, and beginning to cut at different stations the same as beginning to cut the teeth of a dividing engine, which I should like to show the gentlemen of the Committee on Thursday evening. I would however observe, that the greatest and best of all purposes that a screw can be applied to, is the mathematical dividing engine, and it requires but a short screw, such as this tool can make. The engine or tool that the late Mr. Ramsden made, to cut the screw of his dividing engine, I think would now cost little less than fifty guineas to make, and then it would be a short screw that it makes, such as my tool on a larger scale can make. The experience I have had for several years in dividing mathematical instruments, gives me sufficient confidence of the truth of the screw of my engine that was made on this way or principle, that I would be bound to do every thing with my screw, in point of accuracy, that can be done by the late Mr. Ramsden's screw. The utility of the tool does not end here: I believe it will be found to be the best hitherto in use for making the adjusting screws for astronomical instruments. Mr. Dollond has seen and approves it: Mr. Jones, from the late Mr. Ramsden's, considers it new and useful: Mr. B. Stancliffe, late apprentice to, and nephew and successor to Mr. John Stancliffe, likewise approves it: he thinks that it may be applied to the making of adjusting screws for mathematical purposes with advantage, in a variety

riety of instances: Mr. Bacon considers it an improvement; as likewise does Mr. Swygart.

All that I shall add is, that I believe there is no method that is attended with so little difficulty, or so cheap as mine, and likely, at the same time, to produce so good a screw. Should there be any, on producing it, I will withdraw my claim.

I have the honour to be, Sir,

Your obedient Servant,

JAMES ALLAN.

Hewitt's Buildings, Feb. 5, 1816.

To C. TAYLOR, M.D. SEC.

Reference to the Engravings of Mr. JAMES ALLAN'S *Theodolite, and Machine for cutting Screws, Plate* 23 & 24.

Fig. 1, part of the theodolite, divided to half degrees, showing the endless screw, *a*, clamped close in: *b*, the screw that fastens it, by loosening which it is disengaged; the screw-frame then moves freely on the axis, *d*, on which it turns. The theodolite is divided into half degrees; the edge is cut into as many (720) threads, consequently one revolution of the screw moves the theodolite half a degree: *e*, a micrometer on the screw *a*, divided into thirty, which gives minutes, and these subdivided into four, give quarter minutes.

Fig. 2, a section of the circle, the parts a little separated to show the construction; the rack in the edge is parted in the middle: the upper half, *g*, is a ring screwed to it, with twelve screws, thirty degrees apart. *h*, the rim of the under plate, on which the circle moves: *i*, the plate, carrying the screw-frame: *a*, a section of the screw: *k*, the needle.

Fig. 3, part of the screw frame, showing the split head for

holding the screw, and the axis, *d*, on which the frame moves.

Fig. 4, the screw end, with the micrometer, *e*, taken off: *b*, the small screw, which fixes the micrometer when adjusted.

Fig. 5, a frame for cutting screws: *n*, the stock, which holds the cutter or half die, *m*: *o*, *o*, two chaps, which hold the cylinder to be cut; they are fastened to a plate which slides in the dove-tail, *p*, *p*, *p*, *p*: *q*, the screw which forces the cylinder against the cutter.

The cutters are originally tapped in their place, consequently true to the chaps. The tap being made similar to the screw, *a*, which is being cut in the chaps, a small winch is to be put on the square end, *r*, to turn it round in the chaps: *o*, *o*, must be apart full twice the length of the screw to be cut; two cutters are used to cut the screw: the cutter, fig. 6. is first put in; the outer dotted circle is the diameter of the cylinder or top of the thread; the inner dotted circle is the bottom of the thread: this first fits the outside diameter of the cylinder, by which it gives a true lead: when this has cut a quarter or a third down it is taken out, and fig. 7, is put in, which fits the bottom of the thread, (as shown by the dotted circle.) Though the cutters (being made in their place) are sure to give a true cylindrical screw; yet, if the end moving in one chap, is bigger than the other, it will give a screw taper the contrary way; therefore they *must* be of the same size; and, if there should be any fault in the cutter when the screw is cut, passing it once through the contrary way will equalize it, and the thread must then be perpendicular to the axis, and perfectly concentric.

Fig. 8, a top view of the stock, *n*, and cutter, *m*.

Fig. 9, a side view of the frame.

The above only shows its application to set screws for common

common use, but it also generates original screws perfectly true, of any number of threads, and right or left-handed. In this case, the stock and cutter are made as fig. 10, and fig. 11: the back of the stock is made into the segment of a circle, *s*; and the top of the cutter is continued into an index, *t*; the cutter is a single thread, and moves on its edge, *v*, as a centre: this must fit true, and the stock fit close to the cutter to keep it perfectly steady: *u*, *u*, two screws, to adjust and fasten the cutter to any required angle; the cutter should be rather elliptical, for it is best to fit well to the cylinder at the greatest angle it will ever be used. When one turn has been given to the cylinder, fig. 12, a tooth, *w*, is put into the cut, and screwed fast; this tooth secures the lead, and causes every following thread to be a repetition of the first; and, though it might do without, yet this is a satisfactory security.

The SILVER MEDAL *and* FIFTEEN GUINEAS *were this Session voted to the Rev.* JAMES BREMNER, *of the Shetland Islands, for a Night Telegraph. The following Communications were received from him on the Subject.*

SIR,

VARIOUS plans have been devised, by means of which telegraphic communications may be conveyed by day to places very distant from one another; but no method has hitherto been invented by which a single word, much less a distinct sentence, can be telegraphically communicated by night, to the distance of even one single mile.

Polybius makes mention of an invention somewhat to this effect, by means of what is called πυρσεῖαι, which clearly signifies signals by fires, (not by lights,) and probably was no other than what has been common in all ages and countries, *i. e.* by raising large fires on the most conspicuous eminences, to give notice of an approaching enemy, to summon to arms, or to indicate the place of rendezvous, &c.

Mention is likewise made of the number used, as from one to seven. Numbers no doubt would serve to multiply and diversify the intelligence, but still they would be only so many arbitrary signals for special purposes previously concerted; nor, is there any reason to believe, either from their nature or number, that any communication properly telegraphic, could ever have been effected by them.

As a telegraph which could operate by night might be equally useful as one by day, it must naturally have occurred to those who invented the one, to think and consider how the same thing might be done as to the other, but none such existing, it appears that every attempt to invent a night telegraph has hitherto proved abortive.

Having discovered a plan perfectly adequate to the purpose, and presuming to think that the communication of it will not be unacceptable to a society whose primary principle is to patronize and promote every effort which has a tendency to advance scientific knowledge, or which may conduce towards improvement in any art, I humbly beg leave to submit it to their consideration.

One single light constitutes the whole apparatus; and the whole operation consists in alternate exhibition and occultation of that light.

The further explanation is as follows:

Whenever any communication is to be given, the informant shows

shows his light, and waits till the respondent shows his in return; and, having done so for a few seconds, he then retires it in token that he is ready to observe the informant's motions.

But, previous to any operation, the following plan must have been concerted and settled between the parties. The alphabet, according to the order in which it commonly stands, is to be divided into four parts, to be called the first, second, third, and fourth divisions, thus:

First division	*a*,	*b*,	*c*,	*d*,	*e*,	*f*,
Second division	*g*,	*h*,	*i*,	*k*,	*l*,	*m*,
Third division	*n*,	*o*,	*p*,	*q*,	*r*,	*s*,
Fourth division	*t*,	*u*,	*v*,	*w*	*x*,	*y*.

In the next place, the letter in each division is to have its corresponding number marked below it, thus:

First division	*a*,	*b*,	*c*,	*d*,	*e*,	*f*.
	1,	2,	3,	4,	5,	6.
Second division	*g*,	*h*,	*i*,	*k*,	*l*,	*m*.
	1,	2,	3,	4,	5,	6.

Each of the remaining two divisions to be numbered in the same manner.

The light is to be obscured or darkened by interposing before it a thin board or screen, or otherwise, so as to cover it from the view of the respondent; and every such obscuration is to count one, two obscurations count two, and three obscurations count three, &c.

The use of these obscurations, according to the number made, as one, two, three, or four, serve to indicate which of the four divisions is referred to, and intimates, that the letter to be taken down will be found in the division which has been pointed out: example—If two obscurations had been

made, (a pause following,) it would indicate the second division. If four obscurations had been made, it would indicate the fourth division.

This is the first half of the operation.

The next consists in pointing out the particular letter by so many obscurations as correspond thereto, as one if for the first letter in the division, three if for the third, and six if for the last, &c.

There can only be four obscurations for the division, but there may be six for the particular letter in any given division.

The time allowed for each obscuration is about one second, and for the pause (where it should be marked) about double that time. The first pause which marks the division need not be long; it is sufficient if it can be distinctly observable: but the second pause, indicating the particular letter, ought to be long enough to allow time for noting down the letter given.

Thus, the whole operation consists in first marking out the division, and next in marking out the particular letter in the division which had been given.

This can be easily and correctly done by a single person either giving or receiving a communication, if he will only take the trouble of committing to memory the letter and its number in each division.

But it may still be more easily performed by employing two persons on each side.

Of these two persons the business of the one is merely to count the number of the motions made on the light, and to report that number; and the sole business of the other is to mark down the letter agreeably to the report.

Thus the observer of the motions having counted them, and

and finding there were three, he pronounces aloud three; when, he who holds the pen with his alphabet before him, lays his finger upon the third division, and waits; suppose, then, the next report to be five, this he sees to be the letter *r*, and so writes it down, *r* being the fifth letter in the third division.

Thus, the business is made the easiest thing in the world, requiring neither memory nor recollection, but only that the one can count correctly four for the division, and six for the letter; and, that the other can note down the letter to which he has been directed.

Where two persons are employed on one side, the distinction of a coloured light for the division, a white one for the letter would be quite superfluous. At any rate, two could only be correctly managed at the distance of only a few miles; but, at the distance of from twelve to twenty miles, if they were not thirty feet asunder, they would appear as one.

It must be obvious to the slightest reflection, that the use of spy-glasses would lead to endless errors.

I used only one single lamp and reflector, being one of those in the light-house on Copeland island, and its exhibitions were correctly taken by the naked eye at Portpatrick, in Scotland, without missing or mistaking a single letter. Had any enemy landed in Ireland, I could, in defiance of wind and weather, have sent correct intelligence across the Irish sea every night, and ten times in a night, if necessary, to inform of their numbers, strength, situation, motions, &c.

A little experience suggested some very useful rules. In the first place, whatever is to be communicated ought to be written down in as few words as can be consistent with the clear and distinct meaning.

It

It was considered that it was possible some error might be made, and made on the most essential word in the whole sentence; and, if the whole had been given in continuation, there might be a necessity for going over the whole again.

This would have been a very aukward circumstance; but, to remedy this compleatly, a sign was settled upon that would indicate when every single word was finished; this sign is given by making a few rapid motions very easily to be distinguished from the ordinary regular motions made in seconds. The respondent had then to look and see if he had got a distinct word, and if he had, his acquiescence showed that all was right; but, if it happened otherwise, he was instantly to produce his light, which implied, that the word so challenged must be repeated: thus, any error was instantly detected, and immediately rectified, without affecting any other part of the communication. But, the communications from Copeland island to Portpatrick, though they consisted of many hundred motions, not the error of a single letter was made either in giving or receiving them.

If the whole alphabet were to be used, sixty letters might easily be given in five minutes; and certainly it would require no extraordinary address to comprize some important intelligence in sixty letters; but the process would be greatly abridged by using only sixteen letters, in place of twenty-four, and these sixteen will serve every purpose that any greater number can do.

I am, Sir, with respect,

Your obedient Servant,

JAMES BREMNER.

No. 2, Macclesfield Street, Soho.

To C. TAYLOR, M.D. SEC.

Additional

Additional Communications respecting the Rev. JAMES BREMNER'S *Telegraphs.*

SIR,

As I am extremely solicitous (as some mark of both my respect and gratitude) to render any thing which I have the honour to submit to the Society of Arts, &c. as far worthy of their notice as lies in my power, I have thought of some improvement which might be made both on the day and also on the night telegraph; and, I consider it as my duty to submit what has occurred to me on both these points, that the Society may add them, or not, as they shall judge proper, to what I have already stated.

With respect to the day telegraph, which is adapted to an alphabet of sixteen letters only, some may think so many substitutions of one letter for two would be inconvenient and troublesome: In order to remove this objection, a fifth division may be added, (as I think I have already suggested,) to the division side of the telegraph, by means of a particular sign indicating this fifth division.

This sign might be given by bringing a cover over the division part, so that no light would at all appear on that side. To effect this, a Venetian blind might be dropped from above the division side; or, by drawing up from below, a small frame covered with any thin cloth: this last appears to be the most simple, as requiring only one movement in pulling it up, as, when left at liberty, it would, by its own weight, immediately replace itself. The letter side would undergo no change whatever, but would indicate any letter in the fifth division in the same manner as of any other.

Upon

Upon this plan there would be five divisions, and four letters to each division, thus,

First division	*a*,	*b*,	*c*,	*d*,
			k,	*t*,
Second division	*e*,	*f*,	*g*,	*h*,
Third division	*i*,	*l*,	*m*,	*n*,
	y,			
Fourth division	*o*,	*p*,	*q*,	*r*,
Fifth division	*s*,	*u*,	*v*,	*x*.

The letter *x*, seldom occurs, but, whenever it does, the letter *s*, may be substituted for it, to which it is so nearly allied, that the most scrupulous can hardly object to it.

The foregoing alphabet of twenty letters is so ample, that whoever understands any alphabet at all, must deem it perfectly sufficient for every purpose.

Upon the same plan and arrangement of the alphabet the night telegraph may be used.

There will be five obscurations to show the division, and only four obscurations to point out the letter in the last division given; and, whilst it will be equally correct and distinct, it will shorten the operation one sixth part. If there be one more obscuration in the division, there will be two less in showing the letter, and being a middle course between the longest and the shortest alphabets, may be thought the best.

As it is of some consequence to know when a word is ended, this might be indicated by two or three obscurations, made by the blind in rapid succession.

There are only two single letters which constitute a word, viz. *a*, and *j*, and it would be material to mark them as such.

such by the same sign as marks the end of any other word.

I am, Sir,

Your obedient Servant,

JAMES BREMNER.

No. 8, Macclesfield Street, Soho.

To C. TAYLOR, M.D. SEC.

DEAR SIR,

I HAVE received both your letters of the 2nd current. The one informing me, that, for my plan of a day telegraph, the Society had been pleased to honour me with their Silver Medal, and a bounty of Ten Guineas; the other informing me, that the Society had, for my night telegraph, voted me their Gold Isis Medal, or their Silver Medal and Fifteen Guineas, at my option.

I hereby beg leave to signify, that, as the Society has been pleased to give me the option, it will be most agreeable to me to prefer the latter.

I observe, in the Society's regulations, they have made an exception in favour of those who are about to leave the kingdom. It is true I do not fall within that exception, but my situation in the Orkney islands, to which I am presently to return, deprives me of any communication with London, (excepting by post,) as much as if I were in the West Indies: I may say even more so, for there they have regular posts; but there is nothing of this kind between London and the Orkneys.

It was not till two years, therefore, that I received the Society's Medal, in 1809; and, the volume which had been delivered with it, I have never yet seen.

If the Society shall be pleased to consider my case as coming

coming within the line of their intended indulgence, it will be adding much to my former obligations, which it will be my pride and my pleasure gratefully to acknowledge as long as I live. If you will have the goodness to represent the above to the Society, you will much oblige,

Dear Sir,

Your most obedient Servant,

JAMES BREMNER,

No. 8, Macclesfield Street, Soho,
March 4th, 1816.

To C. TAYLOR, M. D. SEC.

The SILVER MEDAL *and* TEN GUINEAS *were this Session voted to the Rev.* JAMES BREMNER, *of the Shetland Islands, for a Day Telegraph. The following Communications were received from him, and a Model is preserved in the Society's Repository.*

SIR,

I HEREWITH send you a model of a telegraph, which, in my humble opinion, will be found superior to any thing of the kind hitherto invented. It is simple in construction, and expeditious in its operation.

I embrace this opportunity of expressing the very grateful sense I shall ever have of the great honour and favour which the Society of Arts, &c. were pleased to confer upon me some six years ago for my life-boat plan; and, if they will now permit me to wait upon them, I shall be ready to attend

tend at any time they may be pleased to appoint, that I may then exhibit practically the manner in which the telegraph is to be used.

I should be happy to submit also to their consideration, the plan of a night telegraph, which will operate at once to the distance of twenty miles and upwards. If you will have the goodness to present the model, and to favour me with an answer, you will much oblige,

Sir,

Your most obedient Servant,

JAMES BREMNER.

No. 6, Macclesfield Street, Soho.

To C. TAYLOR, M.D. SEC.

DEAR SIR,

I BEG leave to offer my best thanks for your attention in bringing to the Society's notice the plan and model of my day telegraph.

I should have noted particularly, that I had purposely omitted to attach winches to the squares below, by means of which the machine, upon a proper scale, is to be wrought; but, as in the model, it is only cat-gut, which is sufficient for the purpose of showing its mode of operation, the purchase of a winch might easily snap the cat-gut, of which there could be no danger where there was an iron chain.

The circular plates admit of somewhat more than one complete revolution—one revolution being all that is necessary, as it equally revolves either way, and consequently can in a moment be put into any position required.

I had a sketch of the plan of my night telegraph ready to lay

lay before the Committee, but they informed me that it would not be agreeable to their rules to take notice of it unless it came before them by the appointment of the Society. I have therefore to request you to have the goodness to offer the enclosed sketch to the Society's consideration; and, if they shall be pleased to refer it to their Committee, I shall be happy to wait upon them, in order that I may exhibit the practical application of my plan.

I am, respectfully,

Dear Sir,

Your much obliged and obedient Servant,

JAMES BREMNER.

No. 8, Macclesfield Street, Soho, January 30th, 1816.

To C. TAYLOR, M.D. SEC.

Description and Explanation of a new Telegraph.

THIS telegraph has two circular compartments in front; and, within side of each of these compartments, there is a circular plate moveable round its center. One half of the plate is a solid semi-circle; the other half is quite open, that light may be seen through it.

On the axis of each of these plates there is a small cylinder; and, at a convenient distance below, there are on their axes two corresponding cylinders of the same diameters as those on the axis of the plates above; and, to the cylinder a chain is attached, connected with its corresponding cylinder below.

The cylinders below are turned each by a winch, which revolution causes the plate to revolve or rest in any position required.

required. The chain admits of only one revolution, but makes that revolution alternately forwards and backwards.

As a preparatory step, the alphabet is to be divided into four parts, thus:

First division	*a*,	*b*,	*c*,	*d*,	*e*,	*f*,
Second division	*g*,	*h*,	*i*,	*k*,	*l*,	*m*,
Third division	*n*,	*o*,	*p*,	*q*,	*r*,	*s*,
Fourth division	*t*,	*u*,	*v*,	*w*,	*x*,	*y*.

The light or open side of the moveable circle is to be the chief object of attention, as it is by the position of it that the meaning is conveyed, and the explanation of one compartment is equally applicable to both. The moveable circle is to have only four positions, viz. two horizontal and two perpendicular, corresponding to the four sides of the square frame, as represented in the Engraving, which show the four different positions into which the light or open semicircle is to be turned; and the position, with its corresponding number annexed, indicates the division of the alphabet referred to. If the light side stands as in the first figure, it will indicate the first division; but, if it stands as in the second figure, it will indicate the second division; and so as to the other two.

The position of the other open semicircle on the right hand side indicates, in the same manner, the number of the letter in the division designated by that on the left; and the position of both indices may simultaneously be changed in a moment, and the letters may be dictated almost as quickly as they can be noted down.

As there are only four divisions, and four letters in each division, there can only be sixteen letters in the alphabet used, as was the case with the first French telegraph.

For this purpose, an abridged alphabet must be previously settled and agreed upon, in some such form as this, viz.

a, *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i*, *l*, *m*, *n*, *o*, *r*, *s*, *u*,
p, *k*, *t*, *y*, *x*,
q.

Here the letter *b* is to stand for *h*, or for *p*; the letter *c* for *k*, or *q*; the letter *d* for *d*, or *t*; the letter *i* for *i*, or *y*: the letter *s* for *z*, or for *w*; and the letter *u* for *v* and *w*.

If the above was to be adopted, then the four divisions of the telegraphic alphabet would stand thus;

First division	*a*,	*b*,	*c*,	*d*,
Second division	*e*,	*f*,	*g*,	*h*,
Third division	*i*,	*l*,	*m*,	*n*,
Fourth division	*o*,	*r*,	*s*,	*u*,

If it were thought necessary to have four letters more in the alphabet, it would be easy to contrive a sign for a fifth division, whilst the compartment for indicating the number of the letter in the division would, without any alteration, designate each of the four additional letters in the same way as before.

Reference to the Engraving of the Rev. JAMES BREMNER's *Day Telegraph. Plate 25.*

This telegraph has two circular compartments or apertures, in each of which is a semicircular black plate of metal, revolving upon its centre. On the axis of each of these plates is a small cylinder or pulley, and, at a convenient distance below, there are corresponding cylinders of the same diameter, moving upon their axes, and connected to the upper ones by chains, (see fig. 5;) the lower cylinders are turned with winches.

M.r James Braby's Fire Escape.

Fig: 1.

Fig: 4.

Fig: 3.

Fig: 2.

W Newton Del.

The Rev.d Ja.s Bremner's Day Telegraph.

Fig: 5.

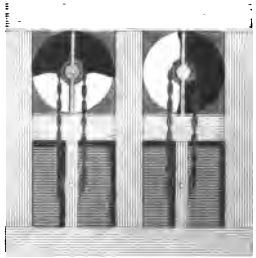


Fig: 6.

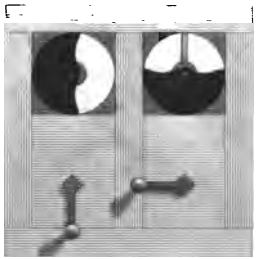


Fig: 7.

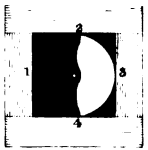


Fig: 8.

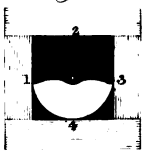


Fig: 9.

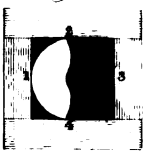
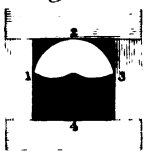


Fig: 10.



J Bacon sculp

The SILVER MEDAL *was this Session voted to Mr.* EDWARD PARKER, *of No. 6, High Holborn, for a single Door-Spring. The following Communication was received from him, and one of the Door-Springs is preserved in the Society's Repository.*

SIR,

HAVING made an improvement in the single door spring, I wish to submit the same to the Society of Arts, &c. for their consideration.

The spring is a regulating one, and combines several advantages over those already in use, as it is the most simple in its construction, and, consequently, not subject to be out of order. It can be applied without the usual inconvenience of cutting away the door, and the strength can be either increased or decreased according to the weight of the door, and the pressure of air, which at times prevent the door shutting: they are also cheaper, considering the difference in the cost of fixing. The price of the common size is one guinea, the extra five-and-twenty shillings.

Should the spring meet the Society's approbation, I hope I shall be deemed deserving some mark of their attention.

I am, Sir,

Your obedient humble Servant,

EDWARD PARKER.

No. 6, High Holborn, March 6th, 1816.

To C. TAYLOR, M.D. SEC.

Reference

Mr Edward Parker's Single Door Spring.

Fig. 2.

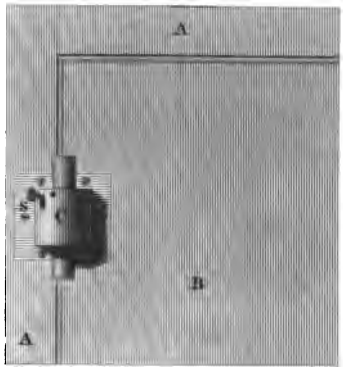


Fig. 10.

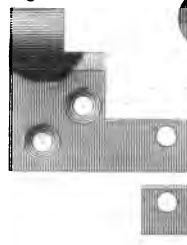


Fig. 12.

Fig. 11.

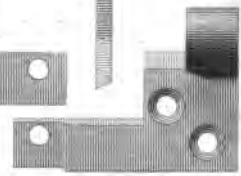


Fig. 13.

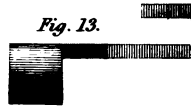


Fig. 14.

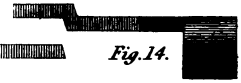


Fig. 8.

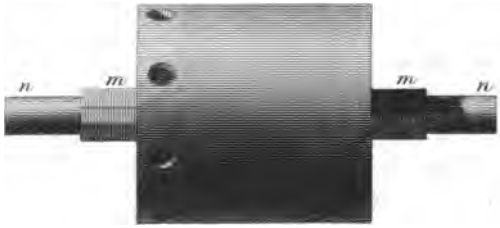


Fig. 9.

Fig. 1.

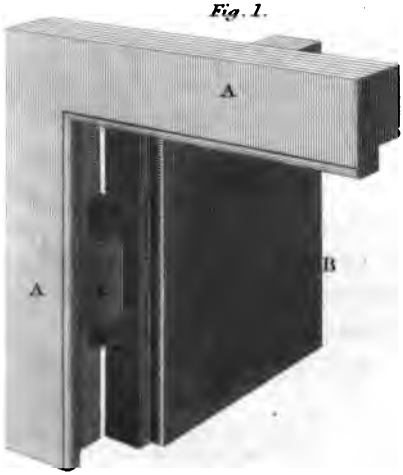


Fig. 3.

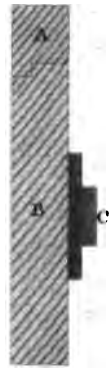


Fig. 6.

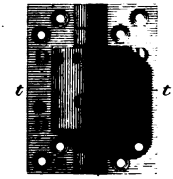


Fig. 7.

Fig. 4.

Fig. 5.

Reference to the Engraving of Mr. PARKER'S *Door-Spring. Plate* 26.

Fig. 1, is a view of the door-spring fixed to the upper part of the door, and to the upper part of the door-frame. The interior spring coils round a centre-pin in several revolutions, as afterwards exhibited, and is fastened at one end by passing through a mortice in the centre-pin. When the door turns round, the centre-pin turns at the same time, and compresses the interior spring by the re-action of the other end of the spring, which is fixed to the concave surface of the barrel in which it is enclosed. The upper part of the barrel is pierced with eight equidistant holes which are perpendicular to the axis of the centre-pin; by this means the barrel is prevented from turning round by inserting a pin or screw with a projecting head, which rests upon a plate attached to the frame on the side of the door on which it opens, so that when the door is shut, the spring is at liberty, but as it opens it exerts a greater force as the angle enlarges. The advantage of having so many holes is, that the action of the spring upon the door may be increased or lessened in any degree by putting the pin in a different hole.

A, A, part of the door-frame.

B, part of the door.

C, the barrel containing the spring. In this view, one of the eight holes is seen entire, and another in part. The stop pin is hid, being on the other side.

Fig. 2, an orthographic representation of a part of the door on the opening side. In this representation of the door-spring, four of the holes are shown, and the pin is shown at *s*, as inserted in one of the holes.

Fig. 3, a section of part of the door and door-frame, showing the projection of the barrel and hinge.

Fig. 4, a section of part of the door and door-frame opened to a right angle, showing the section of the hinge and the pin at *s*, as stopping the barrel.

Fig. 5, the pin by itself.

Fig. 6, the barrel, with the hinge D, D, D, D, folded out; the lines at *t*, *t*, show the joint where the two parts come together.

Fig. 7, end of the same, showing the end of the hinge, and end of the barrel; and, the projecting parts, *r*, *r*, show the lapping of the one part of the hinge upon the other.

Fig. 8, an orthographic representation of the barrel and arbor, or centre-pin; the arbor is square at *m*, *m*, next to the barrel, for receiving the part of the hinge which is screwed or attached to the door, so that when the barrel is stopped by the pin, and the door in the act of opening or shutting, the part of the hinge which is attached to the door carries the arbor or spindle round with it, and the spring being stationary at the other end, makes it exert its force more or less as the door is opening or shutting. The parts, *n*, *n*, at the extremities of the arbor are rounded, so that the other part of the hinge which is attached to the door-frame may revolve freely thereon.

Fig. 9, a section of the barrel, spring, and arbor, shown by removing the end of the barrel.

Figs. 10 and 11, representations of the two parts of the hinge attached to the door-frame.

Fig. 12, end of the same, on a plane perpendicular to the arbor.

Figs. 13 and 14, representations of the edge of the hinge, showing how the two parts lap upon each other, which, when brought together, are fastened by a screw.

Mr. Roberts's Ventilator for Needle pointers.

Fig. 1.

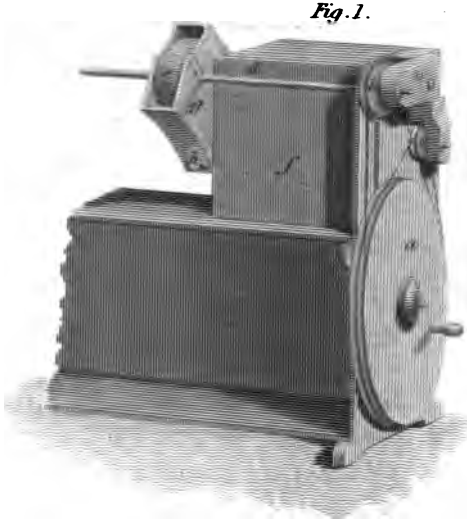


Fig. 4

Fig. 2.

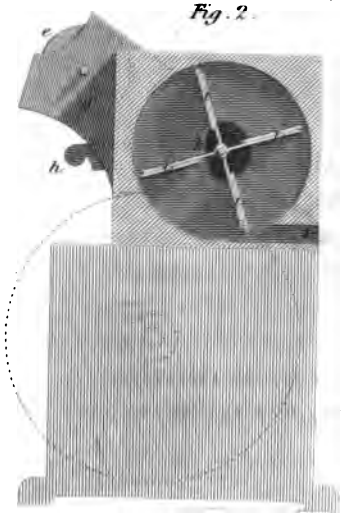
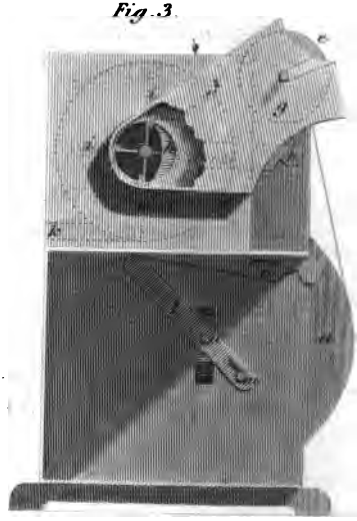


Fig. 3.



Drawn

Engraved by S. Porter

TEN GUINEAS *were this Session voted to Mr.* THOMAS ROBERTS, *of Dumfries, for a Machine for Ventilation. The following Communication was received from him, and a Model of the Machine is preserved in the Society's Repository.*

SIR,

HAVING in the year 1813 had the honour of receiving the approbation of the Society of Arts, &c. for a model of an elevator, I again solicit its attention to a model of a ventilator, upon a new and simple plan, and which may be applied to good purposes whenever such a machine is wanted. Its utility consists in removing noxious dust so prejudicial to persons employed in pointing needles on the dry grindstone, which will be particularly evident from inspection.

I remain, Sir,

Very respectfully your's,

THOMAS ROBERTS.

Dumfries, April 8th, 1815.

To C. TAYLOR, M. D. SEC.

N. B. The model for ventilating, which accompanies this letter, has its fans, each four inches long, in a direction parallel to the axes, and one inch and a quarter broad. Though the cylinder where the fans move is four inches in diameter, a cylinder in the middle is left open for a continual supply of air. When the wheel, *a*, is turned eighty times in a minute, sixteen and a half cubic feet of air would be discharged, admitting that part of the cylinder containing the fans to be ventilated

each turning. A machine, having the fan-box sixteen inches cube, would ventilate at the rate of nearly 1100 cubic feet in one hour.

Reference to the Engraving of Mr. THOMAS ROBERTS'S *Model of a Ventilator. Plate 27.*

Fig. 1, represents the machine in perspective, *a*, the great wheel giving motion to the whole, which, on being made to revolve, (by means of the connecting bands,) turns the lesser wheels, *b* and *c*: *b*, is a small wheel attached to the arbor or axle, *d*; upon this arbor is the grindstone, *e*: *c*, is a small wheel upon the axle of a fan wheel, shut up within the box, *f*.

Figs. 2 and 3, are sections of the same, showing the interior of the fan-box, with the passages for conducting and discharging the dust.

The grindstone being in action, as represented by the first figure, small particles of steel or dust will pass down the funnel, *g*, in which the grindstone hangs, and thence through the circular aperture into the fan-box, (part of the funnel being removed in fig. 3, to show this,) which aperture may be contracted by the sliding-shutters, *h*, *h*.

Fig. 4, the fan-wheel, marked *i*, *i*, *i*, *i*, in figs. 2 and 3, which, being turned with considerable velocity, by the wheel and band (seen at *c*, fig. 1) impels the wind and dust out through the opening, *k*, at the back of the fan-box.

Fig 3, likewise exhibits a method of tightening the bands by shifting the centre of the great wheel which hangs in the slider, *l*; this slider moving upon the pivot, *m*, can be raised or lowered, and with it the great wheel by the wedge, *n*, being drawn backward or forward.

The

The SILVER MEDAL *was this Session voted to Mr.* JOHN GOODWIN, *of Carlton House, for his Probang for administering Medicine to Horses. The following Communications were received from him on the Subject, and one of the Instruments is preserved in the Society's Repository.*

MY LORDS AND GENTLEMEN,

HAVING invented an instrument for the purpose of giving horses balls without the necessity of introducing the hand into the mouth, I beg leave to lay the same before you, and am, with great respect,

Your obedient Servant,

JOHN GOODWIN.

Carlton House, Nov. 8th, 1815.

To the Society for the Encouragement of Arts, &c.

MY LORDS AND GENTLEMEN,

I CONCEIVE it necessary to lay before you some observations on the utility of the horse-ball probang.

I am,

Your obedient Servant,

JOHN GOODWIN.

Carlton House, Nov. 9th, 1815.

To the Society, &c.

The use of the horse-ball probang is for the purpose of giving medicinal balls, without the customary necessity of introducing the hand and arm into the horse's mouth, thereby avoiding

avoiding the possibility of being wounded by the horse's jaws, an accident by no means unfrequent.

For breeding studs, where it is a prevailing practice to give medicines so early as a few months old, from this period up to the adult state, the groom's hand has been found too large to be admitted; but, in order to give medicine, a very dangerous and uncertain practice has been resorted to, viz. to thrust a ball into the throat with a stick; by which method, the animal has been frequently wounded about the top of the throat, and the receiving the medicine rendered very uncertain. In the generality of cases, the ball was broken in the mouth, disappointment in the effect invariably followed, and the animal nauseated with the aloes, &c. sticking to his jaws, frequently for ten days or a fortnight. All these untoward circumstances attending the giving balls to young stock, are totally avoided by my method, as the ball invariably goes down without any obstruction. My instrument has been in use with great success for the last three years.

Mr. GOODWIN begs leave to lay before the Society of Arts, &c. three Certificates in support of the horse-probang.

Carlton House, Nov. 14th, 1815.

To the Society, &c.

CERTIFICATES.

THIS is to certify, that I have used the ball-probang invented by Mr. GOODWIN on a numerous and extensive stud of the Prince Regent for the last three years with the greatest success, and I do consider it to be of the greatest use; and

and I am convinced, that many very young animals would be lost for the want of so valuable an instrument.

(Signed) FRANCIS BACON,
Stud Groom to the Prince Regent.

Hampton Court Park, Nov. 12th, 1815.

THIS is to certify, that the ball-probang made and sold by me, is the invention of Mr. J. GOODWIN, veterinary surgeon to his Majesty, and that the great demand for them fully proves their superiority over all other inventions for giving physic to horses without introducing the hand into the mouth, and particularly to foals.

RICHARD LONG,
Veterinary Instrument-maker to his Royal Highness the Prince Regent, the Army, &c.

Nov. 18th, 1815.

N. B. Instruments have been furnished to his Royal Highness the Prince Regent, his Royal Highness the Duke of York, his Grace the Duke of Rutland, the King of France, and a number of professional and sporting gentlemen.

THIS is to certify, that I have used the ball-probang invented by Mr. GOODWIN on a numerous stud of the Duke of Rutland sixteen months, with the greatest success; and I do consider it to be a most useful and valuable instrument.

(Signed) WILLIAM FENWICK,
Training and Stud Groom.

The instrument is particularly useful in giving foals physic, &c. when the hand cannot be admitted.

Cheveley Park, Newmarket, Nov. 19th, 1815.

Sir,

Sir,

I had the honour to receive your letter of the 28th inst. to request my attendance to-morrow evening at the Society of Arts, to consider the merits of Mr. Goodwin's invention of a ball-probang for horses. I am sorry that a severe domestic calamity (from the fire at Kentish Town) will prevent me that pleasure; but I feel it my duty to say, that, in my opinion, the invention is ingenious, and although not necessary in general practice, yet for foals, and for small mouthed and vicious horses it may be particularly useful. I should however add, that I have had no *practical experience* of the merits of this instrument.

I am, Sir,
Your most obedient humble Servant,

Edward Coleman.

Veterinary College, Nov. 29th, 1815.

Mr. Woodfall, Assistant Sec. &c.

Sir,

In consequence of indisposition, I am prevented doing myself the pleasure of attending your Committee this evening. The cause of my addressing you is respecting a most ingenious and useful instrument called the *horse-probang*. Having witnessed its operation, I am decidedly of opinion it will be found extremely useful as a veterinary instrument for all *breeding studs*. I trust, from its merits, that the invention will be duly rewarded by the Society.

I am, Sir,
Your obedient Servant,

J. Fisher.

Mr. Woodfall, Assistant Sec.

The Agricultural Repository, Wimley Street, Oxford Street, November 29th, 1815.

Reference

Reference to the Engraving of Mr. J. GOODWIN's *Probang, for administering Medicine to Horses. Plate* 18.

Fig. 1, the probang, chiefly made of steel, and about one-third of its real size: *a*, the cup, in which a ball of medicine is to be put, the ball resting on a plate or piston, *b*, within the cup, as shown in the section, fig. 2; this plate is made fast to the top of the bar, *c*, fig. 3, to which the stock or handle is also attached: the cup, *a*, is screwed to a steel spring, *d*, fig. 4, at the back of the bar, *c*, figs. 1 and 3, and to which the trigger, *e*, is also affixed by a screw in it, which slides along a slit, *f*, in the bar, *c*, fig. 3, and its hook, *g*, forced up by the spring, *q*, locks in a hole, *h*, in the bar, *c*. When the probang is introduced into the horse's mouth to its farthest extremity, the trigger is pulled back, which withdraws the cup from off the ball, letting it drop into the horse's mouth, as shown in fig. 5, and then the instrument is withdrawn. The bar, *c*, is double, having a thin plate of brass, *i*, fastened to it its whole length, and to the stock at *i*, to prevent friction between the steel parts, and also fastened to the plate or piston, *b*; this is shown in fig. 5, at *i*, a little separated from the bar, *c*: *l*, is a guide-screw in the spring, *d*, sliding along the hole, *m*, in the bar, *c*: *n*, is another slit in the same bar, *c*, through which the screw, *o*, which connects the cup, *a*, with the spring, *d*, slides. The trigger, *e*, has a friction-roller at *p*, which rolls upon the bar, *c*, and in which is a groove for the spring, *q*, which throws up the trigger to pass: fig. 6, is a section to show it; the spring *q*, is widened at the point, to prevent its falling into the hole, *f*, of the bar, *c*.

The

The SILVER MEDAL *was this Session voted to Mr.* JONATHAN DICKSON, *of Holland Street, Blackfriars, for his Method of propelling Steam-Boats. The following Communication was received from him, and a Model of the Improvement is preserved in the Society's Repository.*

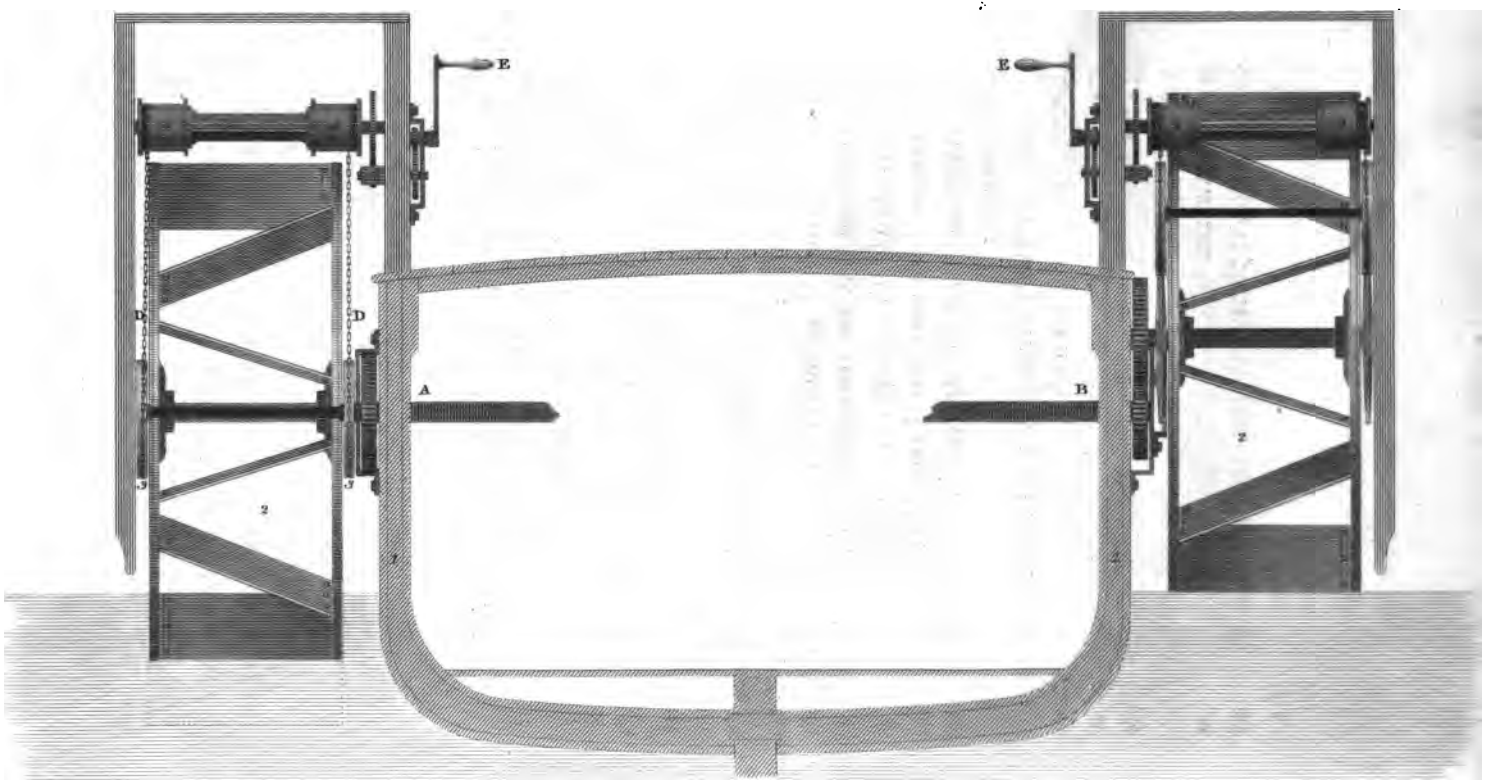
SIR,

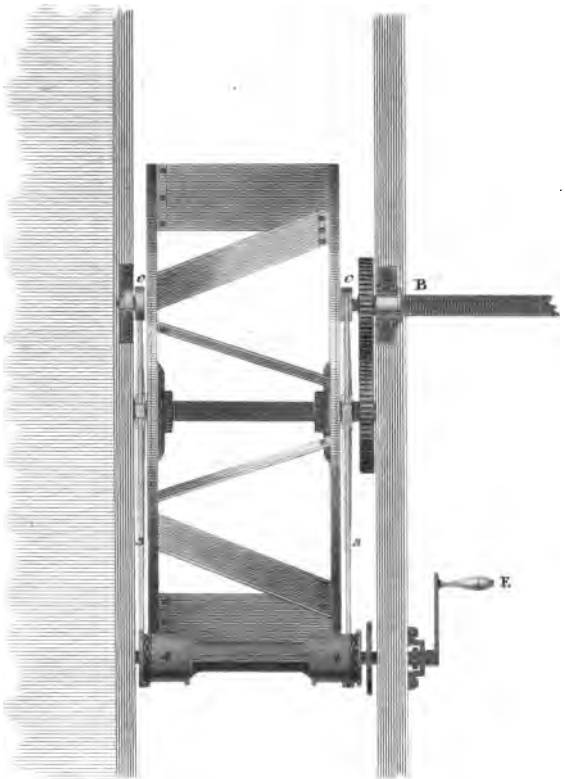
I BEG leave through you to lay before the Society of Arts, &c. a model of an improvement in the construction of the propelling apparatus for the use of steam-boats.

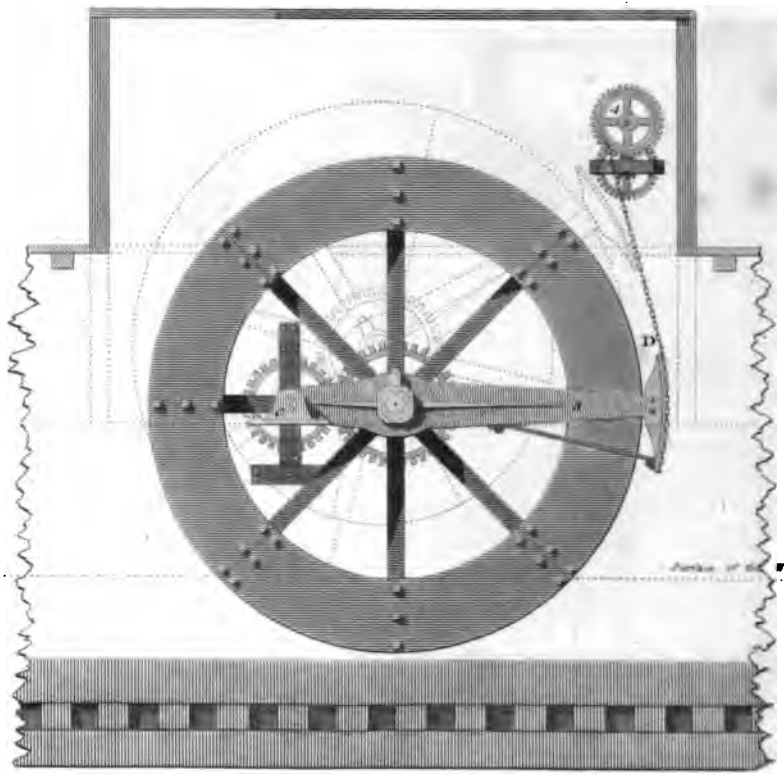
As steam vessels are now about to come into general use, it has been recommended to me by some of my friends to take out a patent for this improvement, and by others to lay it before the Society of Arts. I hereby acquiesce in the latter recommendation, and presume, that the Society will easily perceive its great utility, and that it is likely to become a national concern. It has met with general approbation, and it is considered that few steam-vessels ought to be without it. I have to add, that it is purely an idea of my own; that it has not ever been used; that I made the model of it twelve months ago, and I am now applying it to a steam-vessel of large dimensions.

This improvement consists in a method of raising and lowering the propelling wheels, or their apparatus, while they are in motion, without stopping the engine or any part of the machinery, and thereby allowed to enter so deep into the water as may be found necessary for propelling the vessel at its intended velocity. This is accomplished by means of an eccentric or planetary motion being given to the second motion

Mr Jonathan Jackson's Improved Method of Steering Steam Boats.







Drawn by J. Dickson.

Engraved by S. Porter.

motion of the machinery, which enables it to move partly round the first motion or driving power. In the model I have applied a screw to raise the levers which carry the propellers, but it can be done either by a pinion working in a segment of a wheel, whose radius is equal to the length of the lever, or a common rack and pinion, or endless chain, which last is likely to be the most convenient. All steam-vessels, hitherto in use, have suffered a great inconvenience owing to their propelling wheels being fixed to a certain depth in the water, and having no means of relieving them according to the load they have to carry; but the great utility of this improvement will hereafter be found by those steam-vessels that may carry sails, and perhaps be the only means of enabling steam-vessels to proceed to sea; for instance, suppose a steam-vessel to be going direct against the wind by means of the whole power of her steam engine, and that the wind should change and become favourable, the propellers may, by these means, be immediately raised out of the water, and the vessel allowed to have the whole effect of the sails, thereby saving the expence of fuel. All steam-vessels now in use experience so great an impediment from the propellers being always in the water, as to render sails of no use. Another advantage will be derived when there is only a gentle breeze in the vessel's favour, as the propellers can be set to work, which will take hold of the water at pleasure, and thereby unite the power of the steam to that of the wind, which will secure the passage in the given time, at much less expence, as the engine will only consume fuel in proportion to the labour it has to perform. A farther advantage will be found when the vessel has only a side wind, for, by the use of this contrivance, one of the propelling wheels can be worked with its full power in the water, and the other en-

door open without alarming or awakening the traveller. It also answers the purpose of a cork-screw, the screw fitting into the hollow handle.

The THANKS *of the Society were this Session given to Mr.* MARTIN CAWOOD, *of Leeds, for his Communication of a Method of connecting Water-Pipes. The following Letter was received from him on the Subject.*

SIR,

I HAVE been much astonished in contemplating the old fashioned manner of connecting water pipes in London; and having seen a list of the Society's premiums, in which I have observed one for *laying Wooden Pipes*, I am induced to communicate a plan which perhaps might be useful if generally adopted: at the same time, I must observe, that I do not lay claim to the invention.

As an iron-founder, about twelve years ago it fell within my business to cast the connecting parts of the pipes for the Otley Water Works, which are situated within ten miles of Leeds, and which has induced me to forward the model of a plan which I have thought might answer for connecting water-pipes. I am, Sir, With great respect,

Your obedient Servant,

MARTIN CAWOOD.

To C. TAYLOR, M.D. SEC.

Mr. CAWOOD's Model consisted of rough pieces of wood, representing the unpolished tree, from which the pipes were formed. They were to be united by a cast-iron connecter, and iron hoops were to be inserted at the ends of the pipes to prevent them from bursting.

PAPERS

PAPERS

IN

COLONIES AND TRADE.

The GOLD MEDAL, *was this Session voted to Lieut. Col.* BOUCHETTE, *of Canada, for an extensive Map of Canada. The following Communications were received from him, and the Map is preserved in the Society's Repository.*

SIR,

I HAVE the honour of transmitting to you a complete set of my topographical maps and description of Lower Canada, for the purpose of laying them before the Society for the Encouragement of Arts, Manufactures, and Commerce.

As I am about to leave England very shortly, it would prove peculiarly grateful to me, were the Society to take it under consideration, and express an opinion upon it at an early period. Having received from his Majesty's government the appointment of a Surveyor to Commission for settling the boundaries between the British colonies in North America, and the United States, in fulfilment of the late treaty of peace; I shall, of course, in the performance of

that duty, pass over an extensive tract of country, much of which is not very well known in Europe; I beg leave therefore to offer my services to the Society, (if it is considered that any information may be obtained for it) in whatever way it may be pleased to direct my attention, and my humble abilities can atchieve.

I have the honour to be, Sir,
Your most obedient humble Servant,

JOSEPH BOUCHETTE.

No. 42, *Dorset Street, Portman Square.*
Feb. 17th, 1816.

To C. TAYLOR, M.D. SEC.

The following are the Extracts from the Minutes of the House of Assembly, dated

Quebec, 15*th Feb.* 1814.

"Resolved—That the Petition of Joseph Bouchette, Esq. Surveyor General of the Province of Lower Canada, with a Prospectus accompanying the same, be referred to a Committee, of five Members, with power to send for persons and papers."

"Resolved—That Mr. Lee, Mr. Papineau, Mr. Tachereau, Mr. Mure and Mr. Bellett, do compose the said Committee."

(Signed) W. LINDSDAY, CHAIRMAN.

Committee Room, Friday, 18*th, Feb.* 1814.

"In committee on the Petition of Joseph Bouchette, Esq. Surveyor General of the province of Lower Canada, present,

MESSRS. LEE, PAPINEAU, BELLETT, TASCHEREAU.

"Mr. Taschereau called to the chair.

"Read the order of reference.

"The committee examined Mr. Bouchette.

"Mr.

"Mr. Bouchette untertakes within twelve months to produce the maps and the book mentioned with list hereunto annexed."

"That the expences necessary for effecting the engraving of these plates, and the printing of the book, will amount to 1500*l*."

"Your committee also examined the maps which the said Joseph Bouchette proposes to publish, and to which he intends to make additions."

"Your committee having taken into consideration the whole matter, is of opinion, that the publication of these maps would be of very great utility to government, and to the province, and ought to be encouraged by the legislature, by the grant of a sum of money, to be placed in the hands of commissioners, and applied under their direction, to the publication of the said maps."

"The whole nevertheless humbly submitted."

(Signed) J. TASCHEREAU, *Chairman.*

In a Committee of the whole House.

"Resolved—That it is the opinion of this Committee, that the sum of fifteen hundred pounds currency be applied, under the direction of commissioners, to encourage and assist Joseph Bouchette, Esq. in publishing the topographical and geographical maps of the province."

House of Assembly, Tuesday, 28d Feb. 1814.

"In committee of the whole house, on the report of the Special Committee, to which was referred the petition of Joseph Bouchette, Esq. Surveyor General,"

Mr. Denechaud called to the chair.

"1st on the motion of Mr. Taschereau, seconded by Mr. Lee.

"Resolved—That it is the opinion of this Committee, that a sum of fifteen hundred pounds currency be applied under the direction of commissioners, to encourage and assist Joseph Bouchette, Esq. in publishing the topographical and geographical maps of the province."

On the motion of Mr. Taschereau, seconded by Mr. Pozer, ordered that the chairman do leave the chair, and report the said resolution.

Attested. W. LINDSDAY, &c.

DEAR SIR,

THE Lords Commissioners of the Admiralty permitted me to subscribe in their names for twelve copies of your very scientific and elaborate survey of the Canadas; as well as for 100 sets of that part thereof which includes the St. Lawrence River, for the general supply of such of His Majesty's ships as may be employed in that part of the world. I trust you will receive this mark of their Lordship's favour as a proof of the high estimation in which the Board, as well as myself, hold the skill and abilities you have exhibited in the construction of those maps, and in their accompanying description.

Your publication must have been made at a great expence, and that it may be attended with all the success you so highly merit, is the sincere wish of, Dear Sir,

Your most obedient humble Servant,

THOMAS HURD,

Hydrographer to the Admiralty.

Hydrographical Office, Admiralty,
Feb. 20th, 1816.

To J. BOUCHETTE, Esq. &c.

Gentlemen,

GENTLEMEN,

BEING an invalid prevents me the honour of attending your Committee this evening on the subject of Colonel BOUCHETTE's map of Lower Canada.

The map speaks so strongly for itself as to preclude the necessity of any remarks to point out its merits. This map has evidently been compiled with great care and attention, from the official plans and other topographical documents deposited in the Surveyor General's Office at Quebec, which, combined with Colonel BOUCHETTE's local knowledge of the country, has enabled him to construct a very intelligent map of that interesting province, on a large scale exhibiting the various features with clearness and precision; it is elegantly engraved and printed at a considerable expence, accompanied with a copious topographical description, and is justly worthy the sanction of your honourable Society.

I am, Gentlemen,

Most respectfully,

Your obedient Servant,

WM. FADEN.

Charing Cross, March 9th, 1816.

To the Society for the Encouragement of Arts, &c.

SIR,

AGREEABLE to your request, I have much satisfaction in bearing testimony of the zeal and diligence with which you have brought forward your map of the Canadas, a work which cannot fail to be of great importance both in a civil and military point of view; and I am fully sensible that no exertions

exertions have been spared on your part to render it ample and correct.

I have the honour to be, Sir,

Your very humble Servant,

CHRISTOPHER MYERS,

Colonel; D. Q. Master General, Canada.

London, March 8th, 1816.

Lieut. Col. BOUCHETTE.

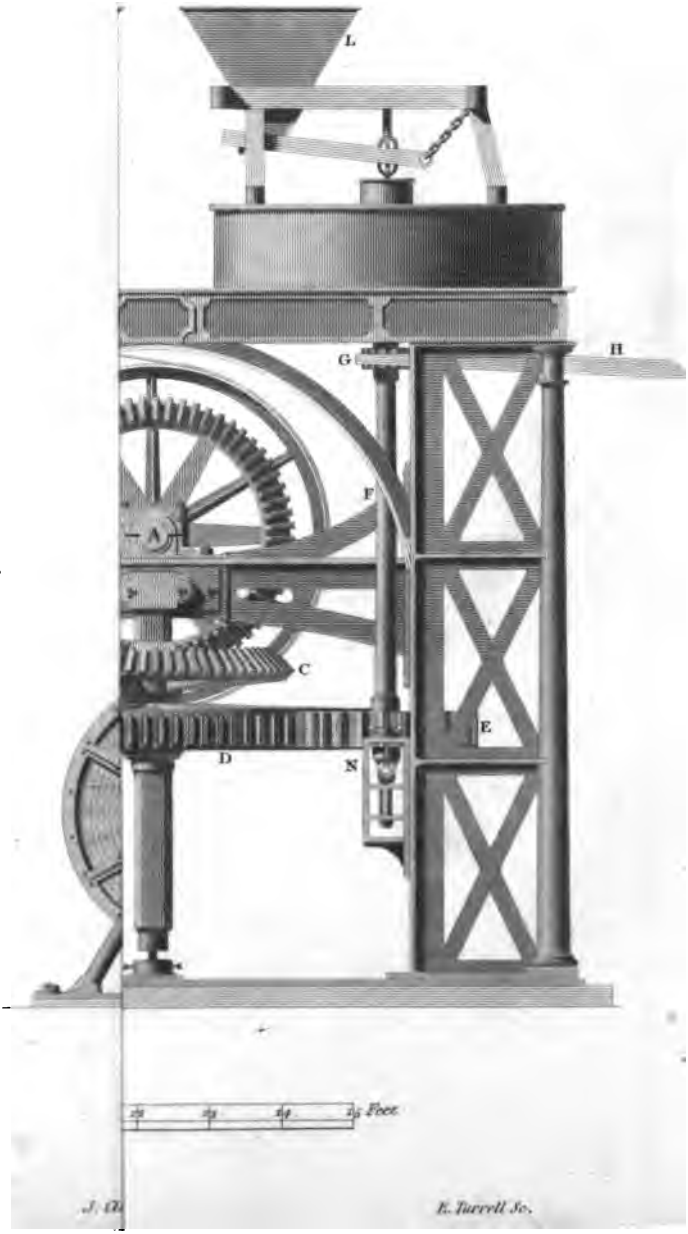
The GOLD ISIS MEDAL *was this Session voted to* THOMAS HOBLYN, ESQ. *of Sloane Street, for preparing Rice in the Isle of Ceylon. The following Communication was received from him, and Drawings of the Machinery are preserved in the Society's Repository.*

SIR,

THE object of sending out machinery for the cleaning of rice was to effect a saving of labour, as well as to prevent the great loss sustained by breaking the grains.

The present plan, practised by the Cingaleze, is probably one of the rudest inventions in nature; it consists of a large mortar, with a pestle, suspended to a lever, and by a constant repetition of blows upon its contents after twelve hours labour, half only will be found fit for the table; the rest is applied to the feeding of poultry and other domestic purposes.

The tediousness of this plan, and the great loss in the conversion of the grain to saleable price, naturally struck the attention


L
G
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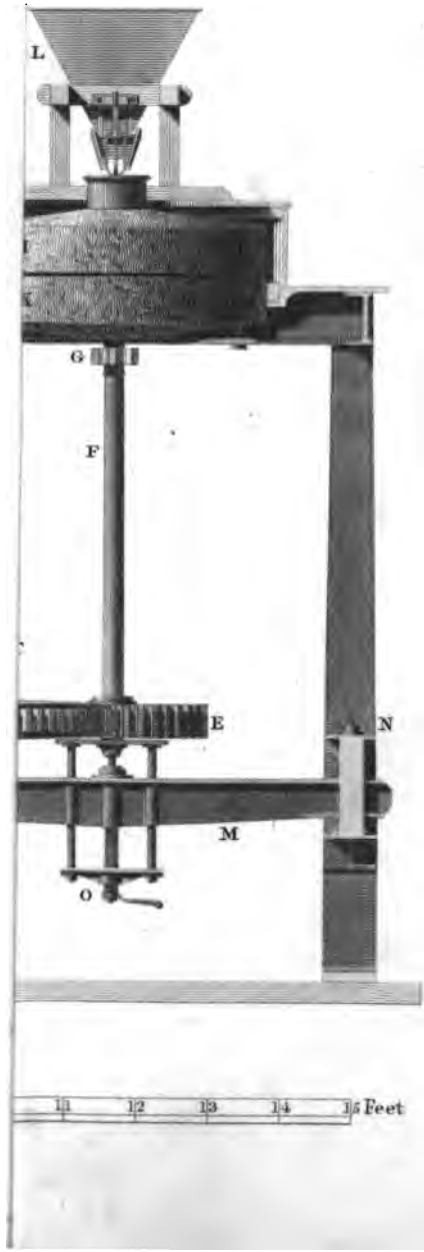
Foot.
E. Turrell Sc.

Fig. 1.



Ed. Turrell Sc.

attention of the late Governor General Sir Thomas Maitland; and having strongly recommended, upon his return from Ceylon, that some better mode should be introduced for this purpose, His Majesty's Secretary of State for the colonies was interested in its adoption, and instructed the Right Hon. William Huskisson, colonial agent for the island, to take measures for effecting this important improvement with the least possible delay. Circumstanced as I then was, and still have the honor to be with my friend Mr. Huskisson, it fell to my immediate superintendance to carry the plan into effect, and having a great delight in all matters relating to mechanics and machinery, I felt a great degree of pleasure in forwarding a plan which appeared to me so truly desirable, and likely to be attended with the most satisfactory results.

Mr. George Atkinson, the late civil engineer, was prepared with a plan, but, as his process was a mere extended adoption of the existing system, and by no means prevented the breakage of the grains and consequent loss, he considered my view of the case as more likely to answer the end in question, and rendered me every assistance in his power to effect its completion.

Instead of the breaking system, it occurred to me that trituration might be successful; and, under this impression, I had several experiments tried in corn-mills, and particularly in the sort of mill where oats are husked for the making of grits. This answered tolerably well in detaching the outside shell, but it had no effect whatever upon the fine cuticle which surrounds the grain, after this has been removed; it was then found necessary to have recourse to some other plan to render the grain perfectly white, and, after several ineffectual

fectual experiments, the mode now practised was that which was (and which will be hereafter explained) fixed upon as being the means of most effectually compleating the process.

Having thus far explained the progress of the intended improvement, it will now be necessary to have recourse to the plans and elevations for the establishment.

The Ground-Plan of the Building; the end and side-Views; and the enlarged Drawings of the Mill-Work and Presses.

The rice-mill was constructed by that most ingenious and indefatigable engineer, Mr. Henry Maudsley, of Lambeth, whose exertions in carrying into effect Mr. Brunel's ideas with respect to the block-machinery at Portsmouth were too fresh in my recollection not to prefer him before any other engineer in London for this part of the establishment. The apparatus for making the oil was constructed by the late Mr. Joseph Bramah, in whose recent death the public have lost a most valuable member of society; but he has left behind him a monument of inventions which must preserve his ingenuity and talents in the recollection of all those who had the pleasure of his acquaintance.

The mill consists of a strong iron framing, supporting by columns a platform about twelve feet square, and ten feet high; upon this platform there are placed at equal distances four pair of horizontal stones, four feet six inches diameter, driven by wheel-work contained under the platform, and supported by a framing of iron fixed to the columns. The mill is placed at about ten feet from the fly-wheel of the engine, and receives its motion by a shaft coupled on the end of that which carries the fly wheel, having a bearing from its

its other end on the framing of the mill; on this shaft is a bevil or mitre-wheel four feet diameter, with cogs, working in another of the same size on an upright shaft in the very centre of the mill; there is also on this upright shaft a spur-wheel, seven feet diameter, working like the last-mentioned bevil-wheel, horizontally; this large wheel has cogs or teeth in its rim which work into four pinions or small wheels, two feet six inches diameter, fitted on the spindles of the stones, and drives the four pair at once; all this wheel-work is so proportioned, that when the engine makes thirty revolutions, the stone makes 84.

The under stone remains stationary, being wedged part into a circular hole in the platform; in the centre is a hole through which the spindles come from below; in this hole a brass socket is fixed to prevent the spindle from wearing, and the upper end of the spindle stands six or seven inches above the stone.

The upper surface of the stone being made perfectly flat and true, and laid quite level, it is punched full of small holes about a quarter of an inch deep, and three quarters of an inch apart.

The upper stone or runner is prepared in the same manner, and exactly balanced on the top of the spindle, with its under surface fitting perfectly true to the upper surface of the nether stone. The whole or the centre of the upper stone is large, and has a cross fitted in it to form the centre socket which fits upon the spindle, so that between the arms of this cross the grain turned in can fall upon the nether stone round the centre.

The stones being thus prepared, and the mill in motion, the upper stone revolves with great velocity, while the nether stone is fixed; the lower end of the spindle or pivot on which

In the whole process there is a little or no loss, for when the stones are well adjusted, very few grains are broken, not more perhaps than 5 per cent. upon the whole, and those very partially.

The rice-mills were set to work in Ceylon on the 1st of October, 1814; and from the report I have received from Mr. Joseph Atkinson, who was sent out to Ceylon to superintend their erection, they perform the mill-work in an unexceptionable manner; and I have no doubt, will prove of the greatest possible advantage to the Island.

As a means of forming some judgment of what this saving will amount to, it may probably be considered interesting to the Society to be furnished with a statement of the produce of the rice in the different districts of Ceylon, which has been furnished to me by Lieutenant-Colonel Edwards, late military secretary to the governor of Ceylon, from the official documents in his possession.

During the whole of General Maitland's government in Ceylon, he turned his attention most particularly to the increase of the cultivation of grain which has been imported for a series of years in large quantities from Bengal and the coast.

The prejudices of the inhabitants in the Cingalese districts render them averse to any changes in their established modes although likely to be attended with the most beneficial effects, and the General was obliged to have recourse to the Malabar districts, to carry into effect the measures which he had in contemplation, for improving the cultivation, or bettering the condition of the inhabitants.

Owing to the wise system which he adopted, of government taking an active superintendance over the districts, of furnishing the cultivators at moderate prices with seed, paddy, from

iron for their tools, buffaloes for tilling the land, and clothes for their families, which they were to repay upon gathering their crop, and which they had hitherto procured at most enormous rates from itinerant Moormen; the whole of the Malabar side of the island rapidly improved with regard to its cultivation, as will be best seen by the following.

Comparative view of the produce of paddy in 1806, the year after the General's arrival in Ceylon, and in the year 1811, that of his departure.

	1806	1811	Increase.
Batticolo Parrahs,	19,016	71,578	
Trincomale,	3,529	10,000	
Wanny,	6,702	40,000	
Jaffuse,	66,570	94,000	
Munar,	33,362	40,000	
	128,909	255,578	126,529 Parrahs

The above is merely a statement of the tythes of government, consequently, the produce was ten times that amount, and the total increase of cultivation in five years was, in the Malabar districts, 1,265,295 Parrahs, or, upon the most moderate calculation 180,755 bags of rice, being worth at 9 R. dollars per bag 1,626,795 R. dollars.

From what is above stated, it will be seen, that, in the year 1811, the produce of the district of Batticolo alone was 715,780 parrahs of paddy. and Mr. Sawyers, then agent of the revenue, calculated, that in two years the cultivation of grain would be so much increased as to lead to a reasonable expectation, that 1,000,000 parrahs would be grown in the district.

The following short calculation will at once shew the great difference between the two modes, and will prove the real advantage which will arise from the more general use of engines of this description.

By the experiments made in this country with the two steam engines lately sent to Ceylon, it was found, that allowing them to be worked ten hours each day, and admitting 300 working days in the year, they would convert annually 576,000 parrahs of paddy into a quantity of rice equal to 147,347 bags, which at 9 R. dollars per bag would amount to 1,326,123 R. Dollars, or, at the par of exchange of 1*s.* 9*d.* per dollar to *L*. sterling 116,065 15*s.* 3*d.*

The converting the same quantity of paddy into rice by by the common method would produce only 82,285 bags which at 9 R. dollars the bag would amount to 740,565 R. dollars equal to 1*s.* 9*d.* each *L*.64,799 8 9

Thus making a saving in one year of *L*. 51,336 6 6

From this must be deducted upon 576,000 parrahs of paddy a proportion of the original cost of the engines, and the annual expence of working and keeping them in order: but this deduction will be considerably lessened, if not totally done away, by a comparison with the actual expence of beating the paddy into rice by the common stamper, which is either defrayed by an allowance of wages for the labour or by a grant of paddy. Admitting, however, the excess of the expence of the engines, to be 5000*l.* annually, which is considerably more than it can possibly amount to, the net gain would be 45,236*l.* 6*s.* 6*d.*

It will be seen from what has been already said, that two engines, similar to those sent to Ceylon, would be at least required for the produce of the district of Batticolo alone,

it

it yielding nearly a million of parrahs:—Another might be, with great propriety erected at Jaffnapatam, which produce 940,000 parrahs; and a fourth at Columbo, where an equal quantity may be calculated upon. There is every reason to conclude, that while they would be the source of considerable profit to government, they would prove of the greatest advantage to the inhabitants, and to the general prosperity of the island.

It would be desirable that a pair of edge stones and some appropriate machinery for sawing timber should be attached to each mill where the district afforded either cocoa nuts or hard woods, by which means an additional advantage would be derived to government, and might possibly lead to the establishment of individuals there, whose enterprise and exertions might be attended ultimately with the greatest possible advantage.

The oil mill is composed of a common pair of edge stones drawn by a shaft from the rice-mill, and the pulp is put into hair bags, and pressed in the hydrostatic apparatus, as will be seen by reference to the plan.

Mr. Atkinson's report upon this part of the establishment fully answers my expectations, I would have wished, however, that he had been rather more explicit, but he concludes his statement with this observation, that, by grinding the cocoa nut, and submitting it to a pressure, a larger quantity of oil can be produced, and in much less time than by the present mode.

I have the honour to be, Sir,

Your obedient Servant,

THOMAS HOBLYN.

Treasury Chambers, 25th Nov. 1815.

To C. Taylor, M. D. Sec.

Reference to the Engravings of Mr. T. HOBLYN'S *Rice Mill. Plates* 31, 32.

A, is the horizontal shaft, driven by the steam engine, on which is fixed B, a bevil wheel four feet in diameter, working into C, and another bevil wheel of the same diameter, on the vertical shaft of which is a spur wheel D, of seven feet in diameter, which works into four pinions on the spindles of the upper mill-stones, two of which are shewn at EE, each of two feet six inches in diameter.

FF, spindles of the upper mill-stones, having indented pinions, GG, near their tops for the purpose of agitating the sieves: HH, shewn in drawing No. 2: II, in drawing No. 1, the upper mill-stones: KK the lower mill-stones: LL, the hoppers: MM, in drawing No. 1. the iron levers on which the spindles of the upper mill-stones are planted, and which can be raised or lowered, to adjust the stones by means of the regulating screw NN :OO, in drawing No. 1, are screws to raise the pinions EE, and cast them out of gear: P, is the drum for driving, by means of a band, the multiplying wheels Q, shewn in drawing No. 2, which give motion to the blanching machines RR, one of which is shewn in elevation, and the other in section, in which S, is the revolving stone: T, in drawing No. 1, is a drum for working the winnowing machines.

Fig. 11.

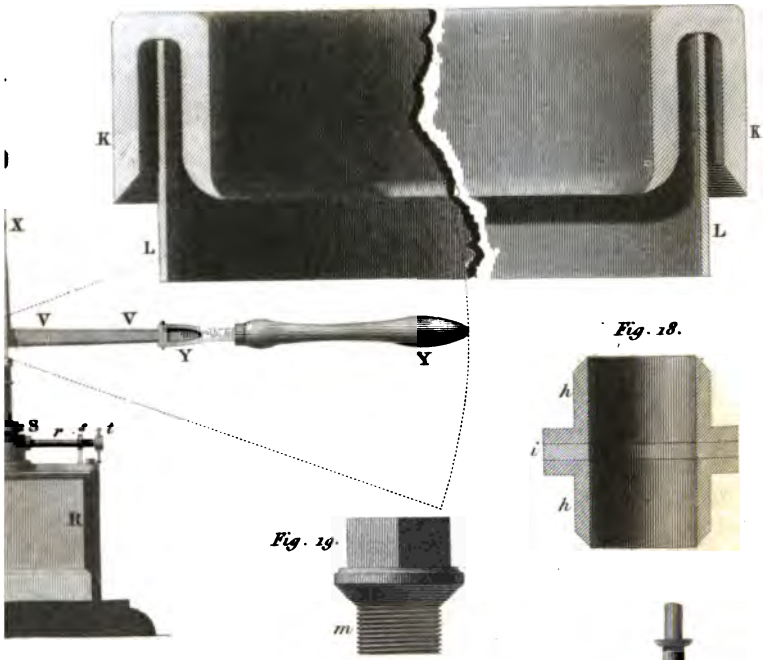


Fig. 18.

Fig. 19.

Fig. 13.

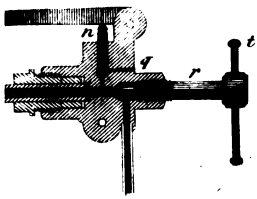


Fig. 12.

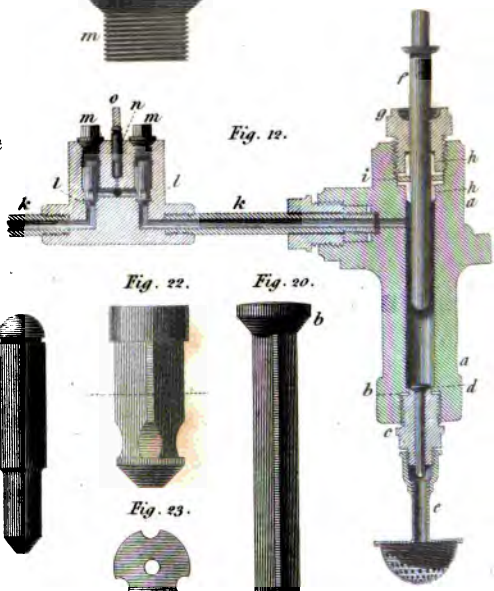


Fig. 22.

Fig. 20.

26.

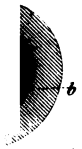


Fig. 25.

Fig. 23.

Fig. 24.

Fig. 21.

Ed. Turrell sc.

The THANKS *of the Society were this Session given to* THOMAS HOBLYN, *Esq. of Sloane Street, Chelsea, for his Communication respecting an Hydro-mechanical Press for extracting Oil from Cocoa Nuts, of which an Engraving is annexed, Plate* 30.

THE public are indebted to Messrs. Bramah, who have, under the directions of Mr. Hoblyn, applied their hydro-mechanical press to this object, for a most liberal disclosure of the particular construction of this important machine.

Figs. 1 and 2 represent a front view of two hydro-mechanical presses.

Fig. 3, the two injecting pumps.

Fig. 4, represents an end view of the press, fig. 2.

Fig. 5, is an end view of the injecting pumps.

Fig. 6, a plan or bird's-eye view of fig. 1.

Fig. 7, represents a horizontal section at E, of fig. 2.

Fig. 8, a plan or bird's-eye view of the two injecting pumps.

N. B. The same letters refer to the same parts in each figure.

AA, AA, figs. 1, 2, 4, 6, and 7, the frames, each consisting of two cast-iron brackets, on which the two presses are fixed: BB, figs. 1, 2, 4, and 7, the press cylinder, made of cast-iron, and likewise forming the bed of the press, at each end of which are fixed two wrought-iron bars, CC, figs. 1, 2, and 4, and CCCC, figs. 6 and 7; at the upper ends of these bars is fixed the cast-iron head of the press, DDD,

figs. 1, 2, 4, and 6: E, figs. 1, 2, 4, and 7, the press piston, the ascent and descent of which constitutes the action of the press: F, figs. 1, 2, and 4, the follower, made fast to the upper end of the piston, and guided at each end by the bars, CCCC, parallel with the cylinder. On the upper side of the follower are placed two rows of woollen bags filled with the ground pulp of the cocoa nut kernels, and having between each of them wrought-iron plates, every third of which is made longer than the others, and has two gaps in each end of it, to receive and be guided by the four bars of the press, CCCC.

Fig. 1, represents the press filled with bags, ready to begin to work; figs. 2, and 4, the bags compressed, the oil making its escape through them, and running over the edges of the plates, down to the followers, on the upper sides of which are channels made to receive and convey the oil to a hole in the follower, to the under side of which is fixed a copper tube, which receives the oil, and ascends and descends along with the piston, in another tube or pipe, as shown in fig. 4, at G, H, I; these channels and the hole, G, are fully shown in fig. 9. The pipe I conveys the oil to the reservoir.

All the beforementioned figures are drawn to a scale of half an inch to the foot.

Fig. 10, represents the piston and a section of the cylinder, drawn on a scale of one inch to the foot. The upper end of the cylinder has a recess, KK, turned within it, to admit a double ring of leather kept distended by a metal ring, which renders the junction between the working piston and its cylinder water-tight.

Fig. 11, is the double cupped leather, shown of its real size;

size; the middle part, however, being removed to save room in the plate; KK, shows a section of the leather, the edges of it being cut to an angle of forty-five degrees, and the edges made thin to embrace the piston, and be brought into contact with the inside of the recess in the cylinder, so as absolutely to prevent the escape of the water either way: LL, is the copper ring, to sustain the leather when the piston is pressed down, and to prevent its edges from being injured by being brought into contact with the bottom part of the recess.

In the upper part of the cylinder a channel, MM, fig. 10, is also made, which is filled with tow or any other soft packing, impregnated with sweet oil, and which is confined by a plate or ring of cast-iron, NN, lying upon it. This packing serves at once to supply the cylinder with oil, and to prevent the admission of any substance which might injure the surface of the piston.

In the side of the cylinder is shown part of the tube, O, which forms a communication between the working and the injecting cylinders: at the end of the tube is a boss, or stout ring of metal, P, which is first screwed upon the end of the tube, and is then immoveably fixed by soft solder; this boss is pressed by means of a perforated screwed nut, Q, close against a square shoulder in the cavity made in the cylinder, and rendered water-tight by the interposition of an oiled leather ring or washer.

RR, figs. 3, 5, and 8, a cistern or reservoir for water, over which are fixed the two injecting cylinders or pumps, SS, one being one inch, and the other two inches in diameter. At the back part of the cistern are fixed two cast-iron brackets, TT, each having two holes, in which the pins or

fulcrums, UU, of the working levers or handles, VV, are put; one of each of these two holes is fixed at double the distance of the other from the centre of the cylinder, by which means the fulcrum can easily be changed, when the lever is level, as the lever has two holes in it opposite to those in the bracket, and two pins are likewise necessary in this operation; for, if the pin be in the outer hole, and it is wished to remove the fulcrum, the lever must be kept *level*, and the other pin put into the other hole; the outer pin may then be removed, and the power will be doubled.

The brackets, TT, are likewise provided with cylindrical holes to receive the upper parts of the pistons, by which means they are kept parallel with the cylinders in use.

The middle parts of the pistons, WW, are made open, to receive the slings and levers; at the upper ends of the openings in the pistons are suspended the slings, by the pins, XX, through the piston, and the upper end of the sling: the bottom parts of the slings are made to receive the levers or handles, through which pins are inserted, forming joints with the levers, by which means the motion of the levers is communicated to the pistons.

The levers have moveable handles, YY, figs. 5 and 8, at one end, and weights, ZZ, to counterpoise them at the other end.

Figs. 12, 13, 14, 15, 16, and 17, are drawn to a scale of one inch and a half to the foot; figs. 18, 19, 20, 21, 22, 23, 24, and 25, to a scale of six inches to the foot, or one half their real size. Fig. 12, is a section of the one inch injecting pump or cylinder, and the junction part which forms a communication between the one inch and the two inch injecting pumps. *a*, *a*, the injecting cylinder, in the bottom of

of which is a valve, *d*, contained in a screwed nut, *c*, which is screwed up close against a square shoulder, in a cavity at the bottom of the cylinder, and rendered water-tight by the interposition of a leather ring or washer, *b* : *e*, a tube screwed to the bottom part of the nut, having a hemispherical end, with a number of small holes in it to strain the water clear from any foreign matters which might prevent the valve from shutting close. (Fig 20, is an elevation, and fig. 21, an end view of the aforesaid valve.) *f*, the injecting piston, (the upper part of it being removed,) which is solid, and turned truly cylindrical: *g*, a perforated screwed nut, which permits the entrance of the injecting piston, *f*, and screws down the two cupped leathers, *h*, *h*, with the metal ring, *i*, interposed between them, close to a shoulder in the upper part of the injecting cylinder, and thus renders the junction between the injecting piston and its cylinder water-tight. The upper part of this nut is excavated to form a receptacle for oil.

Fig. 18, is a section of the two cupped leathers, *hh*, and the metal ring, *i*, of half their real size: *kk*, fig. 12, two tubes, which form the communication between the two cylinders and the junction part. These tubes are secured in the sides of the injecting cylinders, in the manner described in the reference to fig. 10, of the press cylinder.

The other ends of the tubes are screwed into the junction part, and secured therein with soft solder: *ll*, the valves, which open and shut the communication between the injecting and the press cylinders. Above these valves are small screws, *m m*, which are screwed down to a conical shoulder on each of them, which serve to regulate their ascent, and, by the removal of which, the valves may be inspected at pleasure. On the top of each valve is a hole to screw in a pin, to lift the valve

valve out, to be examined when necessary. Fig. 22, is an elevation; fig. 23, a view of the upper part; and fig. 24, a section of the said valves, through the dotted line in fig. 22. Fig. 19, the screw, *m*. Fig. 13, is a section of the junction part, at right angles to fig. 12. *n*, figs. 12 and 13, the safety valve, to prevent the bursting of the tubes and cylinders, on the head of which rests the lever, *o*, graduated on its upper side, and having a weight, *p*, suspended at the other end, which can be moved to any of the notches as required. The bottom part of this valve is made conical, see fig. 25. The water-way or aperture under this valve is only 1-8th of an inch in diameter.

If the weight, *p*, be moved to the end of the lever, the distance of it from the fulcrum will be ten times as great as that of the valve; and the weight being seven pounds, the pressure on the head of the valve will be equal to seventy pounds over an aperture of 1-8th of an inch diameter, equal to the 64th part of a circular inch. Then $70 \times 64 = 4480$ lbs. or two tons on the circular inch. But should the force or pressure of the water become greater, the valve will instantly be lifted up, and the water will make its escape through the aperture at *q*, above the conical seat of the valve.

This valve is of great importance when the injecting piston is worked by a steam-engine, water-wheel, or any other unlimited power. *r*, figs. 13, 5, and 8, the discharging cock; this cock has a cylindrical stem, which traverses through the guide, *s*, screwed on the fore-part of the cistern: on one extremity is a small handle or lever, *t*, and the other end is formed into a screw terminated by a conical end, which can be screwed down to a conical shoulder in the side of the junction part. When this screw is loosened, it opens a communication between the press cylinder and the cistern; but, if it be

be screwed tight up, it effectually closes that passage, and makes the communication complete along the tube or pipe, *u*, fig. 13, and *u*, *u*, *u*, figs. 7 and 8, and is itself secured in the junction part, or the two cocks, *v*, *v*, placed between the two presses: if the cocks be screwed tight down to their conical shoulders, the communication is cut off from both the press cylinders; but, if the right-hand cock be unscrewed, the communication is open to the right-hand press cylinder; and, if the left-hand one is also unscrewed, the communication is complete to the left hand press cylinder.

Fig. 15. represents the two stop cocks, and a section through the junction part. The upper part of the cocks are screwed through the nuts *w*, *w*, which nuts secure the cupped leather, *a*, *a*. against a square shoulder, and thus render the space between the junction part, and the cocks water-tight.

The middle part of the cocks is made truly cylindrical, to pass smoothly through the leathers *x*, *x*. The two tubes which make the communication with the two press cylinders, being secured by the nuts and bosses in the bottom part of the junction part, as before described in fig. 10.

Fig. 14, is a section of a triple water-way joining screw, which is fixed at the back part of the presses, at *y*.

The tube or main *x*, may be continued on to any number, of presses; or a solid plug may be put in before the nut, and made watertight.

Fig. 16, is an external view, and fig. 17, a section of two pieces of tube, or pipes, *a*, *a*, shewing the manner in which they are joined together.

These tubes are made of plate copper, one edge of the plate being hammered to an acute angle, the copper

copper is bent round, with the acute edge towards the inside of the tube, as shewn in fig. 26, of its real size. The other, or outer edge of it, forms a square shoulder on the outside of the tube, along its whole length, which serves to hold a greater quantity of spelter-solder over the joint in in soldering it, than could otherwise be laid upon it, and also prevents it from running off the tube, when in a melted state. The broad surfaces in contact from *a* to *b*, are absolutely necessary, to enable the tube to sustain the vast pressure exerted upon it in use; namely, from 3 to 4 tons, upon each circular inch.

b, *b*, fig. 16 and 17; a boss or ring into which the two tubes *a*, *a*, are screwed, and firmly united, by soft soldering.

c, *c*, is another boss or ring, screwed and soldered on the end of the pipe *a*, the screwed nut *d*, being previously put upon it: this nut being screwed into a cavity, resembling that at *e*, on the other ends of the tubes *a*, *a*, a leather ring or washer *f*, being previously placed on the end of the pipe, before the boss *c*, *c*, will form a watertight joint: the boss *e*, *e*, being previously secured upon the end of the pipe *a*, by screwing and soldering.

These pipes are commonly made in lengths of four feet each.

The action of the press may very readily be comprehended:—suppose the space between the press piston and its cylinder, the conducting tube, and the interval between the injecting piston and its cylinder, to be filled with water, and that an adequate supply of water be included in the reservoir;—if the injecting piston be raised, the water will flow from the reservoir into the injecting cylinder, through the valve *b*, fig. 12. On the descent of the injecing piston, the valve *b*, closes, the water forces up the valve *b*, and

b, and passes through the conducting tube into the press cylinder, where it raises the press piston, together with its load, in proportion to the quantity of fluid injected. On the subsequent rise of the injecting piston, the descent of the valve prevents the return of the fluid, and, consequently the descent of the piston, and the operation is repeated as before described.—When the full effort of the press has been exerted on the objects submitted to its action, the discharging cock *r*, is loosened; the piston then descends in consequence of its gravity, and the water returns through the aperture into the reservoir.

The mechanical effect of the pump will admit of an easy calculation. It is known, that if there be a mutual communication between two columns of any fluid, whatever pressure or effort may be exerted on the one, will be transmitted to the other, in a ratio, proportional to the respective areas of each; consequently, the relative areas of the injecting and press pistons, constitutes the hydrostatic power of the press; and the mechanical effort exerted on the injecting piston is transmitted to the press piston by the intervention of the fluid, in a ratio proportional to their comparative areas.

Let us suppose, as an example, that the diameter of the press piston be 8 inches; and that of the two injecting pistons be 2 inches, and one inch. The areas of the press, and two inch injecting pistons are proportional to the squares of their diameters, which are as 4 to 64, or as 1 to 16; those of the press and the 1 inch injecting pistons are as 1 to 64; this constitutes the hydrostatic power of the press. The mechanical power of the levers is as 1 to 10, when the pin or fulcrums are in the outer holes; and as 1 to 20, when in the others; and by the multiplication of ratios, the four hydro-

mechanical

mechanical powers will stand thus; 16 × 10 = 160 to 1; 16 × 20 = 320 to 1; 64 × 10 = 640 to 1; and 64 × 20 = 1280 to 1; which are in proportion to each other, as 1, 2, 4, and 8. If we therefore suppose the centre of effort on the levers, to be depressed with a force of 1 man = 168lb. 2 men will be =336 lb. or 3 cwt. ×1280 = 3840 cwt. or 192 tons: the objects submitted to the action of the press will therefore sustain a pressure equal to the direct action of 192 tons.

Hydro-mechanical power is not only applicable to a press of every description, but to every thing where accumulated power is required.

The press should be kept clean and neat; the reservoir should be filled with pure water; and the best sweet oil alone should be applied to the pistons.

From the simplicity of its construction, the press is by no means liable to be out of order; but if any extraneous matter attaches itself to either of the valves, their action will necessarily be suspended, until the substance be removed; but this, it is presumed will scarcely ever be found necessary.

In using this press, it is desirable to begin with the two inch injecting pump, the pin of its lever being in the outer hole, in order to save time; when the resistance has become greater than this power can overcome, the pin, of the lever should be fixed in the inner hole and the action continued; when however this power is insufficient to overcome the resistance, recourse must be had to the 1 inch injecting pump, with the pin of its lever in the outer hole; and finally the utmost power of the press exerted, by shifting it to the inner hole.

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MAR 2 3 1917

Printed by R. Wilks, 89, Chancery Lane.